SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[*The* MINING JOURNAL *is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.*]

1873.—VOL. XLIII.] LONDON, SATURDAY, APRIL 19, 1873. { PRICE.....FIVEPENCE. PER ANNUM, BY POST, £1 4s.

Original Correspondence.

IRONSTONE FIELDS—PAST AND PRESENT

nt production of ironstone in the United Kingdom, falls far short of what is required for the furnaces in ating the importation of large quantities from Spain tries, it is worth considering whether the extensive rmerly worked, but abandoned when smelting with charcoal became general, cannot now be made avail- ing back to a very early period we find that ironstone y worked by the Romans, for they have left undoubted ng raised it from the Hastings sands and the clays of l as from the northern and other counties. The Weal- however, were at one time the principal source from t qualities of iron in England were made, and the fur- re in a high state of activity during the reigns of nd ELIZABETH. When JAMES came to the throne there han 300 furnaces in blast in various parts of the king- about 120 years after the number had fallen to about ring the last-named reign that coal was introduced y the celebrated DUD DUDLEY, who wrote:—"I made stores of iron, good and merchantable, and sold to living at 12*l.* per ton; I also made all sorts of cast- h as brewing cisterns, pots, and mortars, and better han any yet made in these nations with charcoal." NDY, whose descendants are now connected with the orks, in South Wales, the Brymbo and Broughton Hall th Wales, and with Coalbrookdale, was also one of the with coal, especially at the last-named place in 1713. iron at that time, however, was very small, for we 40 in the whole of the kingdom there were only 59 fur- making at the rate of about 17,500 tons of pig per largest quantity was made in Sussex, where there were es, with 4 in the adjoining county of Kent. The others all over the country, 6 being in Yorkshire, 6 each in Gloucestershire, and four in Derbyshire. Hereford- hire had 3 each, whilst Brecon, Glamorganshire, Den- lshire, Staffordshire, and Worcester had two each, hire and Nottingham had one each. Now, as in all these ust necessarily have been plenty of ore, the working stopped at several of the most important of them erseded charcoal, and the manufacture of iron mi- he woods and forests to the collieries of Staffordshire , there can be very little doubt but what there are able deposits of ironstone still left more than equal to nts of the furnaces in all parts of the kingdom for o come without having recourse to Spain or any other

t will have been seen, was at one time the great iron- nty in the kingdom, and it is quite within the scope that it may again hold a very high position in con- the most important of our national industries, seeing ing bored for at a point at no great distance from as formerly made; and, in the opinion of Mr. GODWIN- Mr. PRESTWICH, is likely to be found. Still, there o believe otherwise than that there are very extensive onstone extending over a vast area throughout the en- ealdens, of a very fine quality, for CAMDEN states that iron made from it was fully equal to the best Swed- early all the ironwork in St. Paul's Cathedral, and as employed in most of the oldest buildings in Lon- uced at the Sussex furnaces. The Weald clay is from rds in thickness, and comprises clay of various colours, ous ironstone. It is known to pass beneath the lower various parts of Surrey, Kent, and Sussex, appearing Wight and again at Hastings, and forms the bed of the nel. The green sand, its colour being derived from the hloritious silicate of iron which it contains, is found e entire of the Wealdens of Kent and Sussex, and goes ridgeshire into Wiltshire, presenting all the appear- hly ferruginous sand, with a great deal of oxide of iron. r Devizes, the iron is now worked on an outlier of the and. Here, then, is a truly vast field in which iron ound, in all probability in great abundance. It was y parts of Sussex, no doubt in close proximity to the ch were situate at Battle, Ashburnham, Mayfield, Bur- gley, Wadhurst, Cuckfield, Heathfield, Tilgate Forest, rs that the last furnace was worked at Penhurst, near as recently as 1848. The lower green sand rests, we he beds of the Wealden and Purbeck rocks, and the s of these deposits is estimated at 1300 ft., with an square miles.

comprised within the Wealden district, and had for- rnaces, there is every reason to believe that ironstone l there. In Nottinghamshire also, where some ore en worked during the last century, there is now plenty e colliery districts, there being good beds alternating l, shale, &c. Warwickshire, too, during the last two n raising ironstone in connection with the coal, and of ality, containing as much as 50 per cent. of metal. unty it is not too much to say that in the course of or two very large supplies will be obtained, and that will ultimately join those of Northamptonshire. Sin- n, there was one furnace in Hampshire in 1740, and so present time; and it is, as then, a charcoal one, and n 1869. It is at Warsash, near to Southampton, and ssrs. HARRISON, AINSLIE, and Co., of the Newland w Ironworks in the Furness district.

e it may be said that there are both old and new iron- In the southern part of the West Riding ore has been aised during the last 800 years, and there are deeds in wing that in 1200 King JOHN confirmed to the Abbey n Lincolnshire, all its lawful possessions, including Sunnocliffe," which was afterwards written "Thun- later Thorncliffe. As showing the state of the iron it may be stated that during that year it was proposed import duty on American iron, which was strongly Yorkshire makers, and Mr. WORTLEY, of Wortley, was their advocate in the House of Commons. What a change since then, for instead of receiving we now send thousands of tons to that country almost monthly. Still, the Great Yorkshire ironstone field was discovered little more than 30 years ago, and now it is the most productive in the world, for in Cleveland, in 1871, there were 4,588,900 tons of ore raised, being considerably more than one-third of the entire produce of England. And who will say that there are not other Clevelands yet undiscovered in more than one part of the kingdom?

The next of what may be termed our recently-discovered ironstone fields of any importance is that of Northamptonshire, where the ore is now being worked in a straight line for nearly 40 miles, from Market Harborough to Weedon. It is now only about 20 years since the top bearings were removed by Mr. W. BUTLIN, not far from Wellingborough. The area of the field is large, and there is very little doubt but what it extends for a considerable way into Bedford- shire. During the last two or three years great progress has been made in the development of the ores, and we take some little credit to ourselves for such, seeing that we were about the first to make its value generally known. We have a strong proof of this in the fact that whilst there was raised in the county 540,259 tons in 1869, in 1871 the quantity was 779,341, an increase equal to more than 40 per cent. Large, however, as is the output, yet there is no reason why it should not be at least double what is, seeing that there are entire districts yet untouched, whilst in the adjoining county of Rutland the same beds of stone will also be found.

Lincolnshire is the last county in which ironstone, to any extent, has been brought to light, its discovery dating a little more than a dozen years back. The ore is worked at Frodingham, about midway between Doncaster and Grimsby, in a rather wild country, and at some distance from a market town. There is, however, every ap- pearance that a town, a second Middlesborough in fact, will be raised on the estate of Mr. C. WINN, who is one of the largest owners of minerals in the county, and on whose estate, in addition to seven furnaces now in blast, ten more are in course of erection. Below Frodingham the Earl of YARBOROUGH has a large area of ironstone, which as yet has not been touched. The iron trade of Lincolnshire may truly be said to be at present only in its infancy, the output of ore last year having been between 300,000 and 400,000 tons. But it is evidently destined to become one of the leading centres for the production of iron; and in the event of coal being found in the county, which is more than probable, then it will be scarcely second to any.

In Oxfordshire some ore is now being worked, but not to such an extent as to call for any special remarks. With the above facts in view, it is evident that there are vast tracts of highly mineralised ground at present lying fallow that if sought out and worked would furnish an almost unlimited supply of ore, sufficient to meet the re- quirements of the country for a long series of years to come, whilst there is every reason to believe that the discovery of new fields rich in iron, and probably as extensive as any of those we know of, is far from being exhausted,

ROCK BORING MACHINERY.

SIR,—At the Gonley Colliery, near Aachen, Prussia, air compress- ing apparatus is employed in driving rock-boring machinery, two pumping engines, and several pneumatic tackles. The following particulars have been obtained in connection with the driving of a deep cross-cut by mechanical means:—1. Depth of level from sur- face 230 fathoms; 2. Size of level 8 ft. by 8 ft; 3. Rock—hard sand- stone and tough slate; 4. Number of men employed with boring machine, two per shift, two shifts being made per 24 hours; 5. Rate of driving from 5 to 6 fathoms per month; 6. Cost of tools with machine boring much less than hand boring; 7. Cutting angle of tool very low, set or "Z points" employed; 8. Rate of machine boring, 1 in. to 1½ in. per minute; 9. Depth of hole bored with one tool 30 in. to 40 in.; 10. Time required to change borer two to three minutes, to shift boring cylinder for new hole four to five minutes; 11. Number of blows made by machine per minute 350 to 400; 12. Pressure of air at surface 60 lbs. per inch, near the boring machine 52½ lbs.; 13. Number of holes bored without shifting frame fourteen; 14. Average total cost per running fathom of ground 4*l.* 9s. 3d.:—

Wages	£3	12	9
Maintenance of machine, interest and redemption of cost of plant	0	13	6
Power (estimated)	0	3	0
Total	£4	9	3

As the two men attending the machine forward the stuff, one- half of the working time is set down for this operation, and from the time remaining three-fifths for removing the machine, changing the borers, and blasting the holes. Taking the theoretical perform- ance of the machine at 300 strokes per minute, and 60 lbs. pressure in the compression pump over the atmosphere, 1 7-10ths horse- power is required. For actual boring two hours per eight hours shift is reckoned.

Before the men understood the boring machine the rate of driving was very low, now it is considered that four men employed in a level will do the work of 6 to 8 hand-borers. The general results seem to be—1. With machine boring a level may be driven, viz.:—

In very hard rock	3 to 4 times more rapidly	than by hand labour.
Moderately ditto	2 to 3 ditto	ditto.
Less ditto	1½ to 2 ditto	ditto.

2. A less number of hands will suffice for a level; and 3. Good ven- tilation is secured, enabling the men to return to their work almost immediately after blasting. JOHN DARLINGTON.

2, *Coleman-street-buildings.*

IMPROVED ORE HEARTH.

SIR,—I am glad that I have been able to amuse my old friend, Mr. Wm. Price, of the Derwent Smelting Works. I was not aware, from my previous acquaintance of him, that he possessed such a particular aptitude; but as I now know his prevailing temperament better, I trust the following observations may afford him a "little amusement" also. I wonder how Mr. Price makes out that my letter to him of Feb. 26 was so amusing, and incompatible with a knowledge of "Mr. Johnson's ore hearth," and also how my letter to the *Mining Journal* of March 22 was prejudicial to Johnson's im- provements. If "Johnson's improved ore hearth far exceeds any plan of smelting Mr. Price has ever witnessed" how does it happen that he, being in possession of such an exceedingly superior instru- ment, never uses it, but does the work of smelting in the rever- beratory furnace? Mr. Price appears to have great notions about duty—duty to the public—and duty (especially to Mr. Johnson), and is most anxious that such should go forth to the world, for, says he, "I have felt bound to ask you to insert this in your next issue," but Mr. Price, so brimful of duty, has signally failed to per- form it, for he entirely withholds the slightest information about Johnson's improvements. Mr. Johnson had a precursor—"A Practical Smelter"—who quite accidentally fell upon the principal improve- ment in the building of the ore hearth, and who accomplished every- thing that has since been done by Mr. Johnson, and proof of this can be given by actual statistics taken from experiments made and work done over a considerable period of time. I am now having several improved ore hearths constructed, which after being tested, the public shall be informed of the result. The improvements are simply mechanical in all cases, and the plan requires to be varied for different classes of blasts and ores. I may add that the bene- ficial results are not the same under all circumstances.

Haydon Bridge, April 10. C. DODSWORTH.

INVESTMENTS IN WESTERN AMERICA—No. VII.

SIR,—The capitalists of the Pacific Coast complain, and with some degree of justice, of the conditions imposed by English capitalists whenever co-operation is proposed. These conditions may be well illustrated by a case in point. Two years ago California was visited by an English civil engineer of great distinction. This gentleman had superintended the construction of an Indian railway, of irrigation works, and had been pressed by the Indian Government to resume his labours in India, which had been interrupted by ill-health. Finding the climate of California well adapted to his constitution, he wished to settle there, and he refused most tempting offers to undertake the construction of railways in Japan. Struck with the enormous agri- cultural wealth of the two great valleys of California, the St. Joaquin and Sacramento, and with the wonderful results which might be rea- lised by an improved system of irrigation, he amused himself by mak- ing a complete survey of those valleys, in the course of which he discovered that several millions of acres of the richest land, now un- productive, or only partially productive, might be irrigated from the Tulene Lake. The increased value of the land so irrigated was esti- mated at many millions sterling, whilst the canal for irrigation would afford the means of bringing the produce to Oaklands, and also a splendid supply of water and water-power to that important and rapidly increasing city.

After two years of hard work the scheme was submitted to the capitalists of San Francisco. The plans and sections were all com- plete, and it was resolved to make a proposal to English capitalists to join in carrying out the works. A million sterling was required, and it was proposed to send over the engineer to ask for half the capi- tal. No difficulty was experienced in satisfying our City million- aires as to the soundness of the scheme, but the conditions were as follows:—

1.—The major part of the capital was to be raised in England, thus destroying at once the principle of equality.

2.—The majority of the directors were to be elected in England, and to reside in London, just as if a business requiring the most accurate local knowledge and constant supervision could by any possibility be successfully conducted 6000 miles away from the seat of operations.

3.—It was insisted that the English directors should be ade- quately paid for their services—that is, that the directors should be paid for duties they could by no reasonable possibility perform. At the same time the Californian directors would be obliged to do the real work for nothing, as it is not customary to pay the directors in that country.

4.—Two English directors were to be sent to California annually, to inspect the works and accounts at the expense of the company. In other words, that two gentlemen not knowing anything what- ever of the affairs of the company should be sent over to intermeddle.

Lastly.—The syndicate further required a commission of 10 per cent. on the proposed capital for their own special benefit.

These terms were submitted to the San Francisco capitalists and indignantly rejected, and I must say with reason, as they amounted to a practical taxing of the capital to be raised in England of at least 15 per cent., whilst every guarantee of good management was taken away by the preponderating influences secured for the English managers.

It should be remarked that it was proposed throughout to place the conduct of the scheme in the hands of the English engineer, whose standing ability and character were a sufficient guarantee for the result; and whilst no possible objection could have been taken to the appointment of an English auditor, or to the occasional or even permanent residence of an English director, he proposal to retain the entire control in London must have been completely suicidal. The attempt to exact a commission of 10 per cent. illustrates the vicious system under which alone the public in England are allowed to participate even in the soundest enterprises. The syndicate must have their profit *conti qui conti*, and the public at best come in at a disadvantage. My idea is that no exclusively English company has much prospect of success in California. It is next to impossible to manage any considerable concern from this side. The English do not understand the conditions of success. They mistake the character of the Californian people altogether. They too readily listen to adventurers and quacks, whilst they distrust those who are really qualified to advise and co-operate on equal terms. Nothing will alter this except a closer personal association between the two countries.

The facilities of intercourse are growing rapidly. Every year the number of English travellers in California is increasing, and I ven- ture to believe that no traveller goes there without investing some- thing in one or other of the numerous tempting enterprises which he encounters at every step. This personal association is the only sound basis of successful enterprise. We must work with the Ame- ricans, or we must lose our money, and I see less difficulty in work- ing with them than with Turks and Japanese. We speak the same language, belong to the same race. Whatever we may think of some, there are amongst them a fair proportion of honourable men. We see here in London by no means the best specimens. The quiet, honourable men of business are too well occupied at home to have time for selling worked-out mining properties. But the co-opera- tion of this important class is essential. We do not want any ex-

tension of stock-broking syndicates, but a really genuine co-operation between the capitalists and business men of both countries. With such co-operation investments in Western America will be safe and successful. ——— A TRAVELLER.

MINING IN COLORADO—THE CLIFTON MINE.

SIR,—I did not intend to take any notice of your anonymous correspondent, "One Who Knows," on my remarks on the Clifton Mine, until a letter appeared in the press of this place, a few days since, by Mr. Richardson, who I am informed was one of the projectors of the Clifton Mine, stating that there is a certain "ring" in this place, who are trying to injure mining, and the reputation of some of the citizens who are trying to promote the welfare of the place by honest and legitimate mining. Now, Sir, I cannot see that any remarks made by me on the Clifton Mine have reference to Mr. Richardson, or the citizens of the place, What other people may have written has nothing to do with me. Neither have I connection with any "ring," and I should very much regret to be one of that class; but I have no doubt the persons alluded to can prove the truth of their assertions if required so to do.

Your correspondent says the general impression is antagonistic to Colorado as a mining county, and which has been admitted to have exhibited at the Paris Exposition the finest lot of specimens ever produced. In reply to the first paragraph I have only to say that I knew Colorado to be a good mining county, and if properly managed, would not be behind other mining counties for profits. But, Sir, "One Who Knows" must not think everything that is puffed up for sale is going to be a prize; there are blanks here as well as in every other mining county, and which are generally puffed up by a certain class for sale in the London and other markets to deceive the public, and when the truth is stated in regard to them the persons are called ignorant, ill judged, know nothing, venomous, and everything that is bad. But Sir, such assertions will not make any difference to me, I have endeavoured to lay before your readers the facts for the welfare of the capitalist and honest and legitimate mining, and shall continue to do so as long as you will favour me with space in your valuable Journal for them. I still adhere to my statement of the Clifton Mine, and time will prove who is right—"One Who Knows," or your ignorant correspondent. I should presume by the remarks of "One Who Knows" on the specimens exhibited at the Paris Exposition, that some of them came from the Clifton Mine, and if so I should, besides many others, like to know what part of the mine they come from, or if from the silver mines of Georgetown and Caribou; but what that has got to do with the Clifton Mine, perhaps "One Who Knows" will have the goodness to inform us. Your correspondent also says that I stated that the difficulties of the Champion Mine would be covered by the company buying another 100 feet in length. If he will have the goodness to refer to my statement in that letter on the Champion Mine he will find himself in as great an error as when he states the Clifton Mine will pay handsome dividends at not one-half the value of the ore. If your correspondent knows so much of the Clifton Mine as he pretends, perhaps he may be able to give through the Journal some information as to what has become of the party that was going to put up smelting works in this place about 12 months since, who, I believe, were in some way connected with the Clifton Mine, and who had paid into their bankers about $1000 by the poor men of the place, which was to be returned in full if the works were not carried out. But I find the promoters have drawn all the money from the bank, and are *non est*, and cannot be heard from.

I have several times alluded, through your valuable Journal, to the absurdity of English companies sending out men here to look after property who are not at all qualified for the place nor the responsibility on them, and after they get here neglect their duty by loafing around in the saloons and gambling dens, making themselves a laughing-stock to the Americans and a disgrace to their own countrymen—bringing a bad repute on mining in the country and the mining men of England; and although often advised by their friends, and also by the respectable inhabitants of the place, it has had no effect, and the press has been obliged to make some remarks as to their conduct, some of which I herein enclose, which you will, no doubt, publish to show the mining companies of England their error in sending such men here, and putting a responsibility on their shoulders more than they can bear. H. B. GROSE.

Central City, March 25. ———

MINING IN COLORADO—CORNISH MINERS.

SIR,—In my last letter I stated there were only three mines working by public companies in this and the Nevada district, and I find there are now employed in these mines 150 men, including millmen, engineers, and mechanics of every description, which I find from a careful estimation to be one out of every ten labourers in the two districts employed by public companies, the remainder of the men being working on lease, either for themselves or for other persons who leased the mines that have been abandoned for poverty and paying the percentage mentioned in my last letter. Whether this percentage is paid to the shareholders or put into the pockets of the agents is not for me to say. Now, Sir, I want to know of some of the American experts in mining what this place would be, with the city of Black Hawk and Nevada, containing a population of nearly 6000 inhabitants, with its numerous stores of every description, over fifty hotels and saloons, three daily and three weekly newspapers, and various places of amusement, which take not a trifle to support, without mining. Now, Sir, can it be expected that this place can be kept up with about 150 men, which is all that is employed by any public company, and many of them Cornishmen, which I find to be three-fourths of the whole population, now about 1500, which has to support the whole place, as it is a known fact that the entire place is kept up by mining. Let the Cornishmen leave the place, and Central City, with Black Hawk and Nevada, would be desolate hamlets, like many other mining towns of Colorado.

I am not going to argue that the Cornishmen are all pefection, but I do say that they are the stand-by of the place and of mining. I was to-day talking with one of the largest—I may say the largest—storekeepers in the place, and he said if the Cornishmen were to leave the place himself and many others would be obliged to close their stores, as they were the men that paid their way, which, he was sorry to say, was not the case with all other people; yet we are told in the face of these facts that the Cornishmen are a hindrance and an obstruction in America, which must be imputed to people's ignorance of the value of their labour and mining in all its branches. I will give you an instance or two that have lately come under my own notice of the Americans' expertness in the management of mines. The Levitt Mine, which has already been referred to in your valuable Journal, and which is undoubtedly the best mine in the district, if properly managed, made a profit in the months of December and January of over $20,000, and in February I am informed did not pay its cost, and this month I fear it will be worse, as the stamps have been idle a week or more for the want of dirt, and very little coming up from underground, they having taken out all the ore available before the shafts were down to a deeper level, and now they are obliged to wait to have the ground opened up for stoping, paying rent for stamps standing idle, cost of steam on the mine, lost in labour, &c., which might all have been avoided if proper judgment had been used. Whether the fault is with the agent or the proprietor I am not aware, but should think the agent, as the proprietor was absent at the time. But let the fault be where it may, it must be admitted that it is a bad way to work mines, and causing great expense that might be avoided. But, Sir, the American experts do not think anything of this; if they can make a profit for one month by taking out all the ore in the mine to enable them to brag what profit they made in such a mine while they were in charge of it is a great object with the experts of this place. No matter what the cost is to again put the mine in working order, you will hear them brag for years of what profit thy made. I know an agent who took charge of a mine when the shafts were down and the levels opened up for stoping, and he at once took out all the ore that was available, and made a profit of about $5000. He was considered a wonderful man, and extolled by the press—what an excellent miner he was! But what was the result? To open up the mine after this foolish proceeding in two months he run the mine from $16,000 to $18,000 in debt, which is still owing, and the mine standing idle.

Many such instances as this might be mentioned, but I think these will be sufficient to let your numerous readers know that the American expert in mining is not all that he pretends to be, and which he so proudly boasts of. Sir, what would the mining companies of London say to their agents if they were to take out every pound of ore in the mine, and give them a profit, and then for the next 12 months make calls on them to open up the mine? I think if it were possible they would be kicked from John O'Groat's House to the First and Last, and it would be no more than they deserved. If the Americans are such experts in mining and machinery as they claim to be, why do they want English capital to be brought here, and English companies to purchase their mines? The answer is plain: they cannot make them pay by working them but they can make money by selling them, too often deceiving the public by misrepresentations. Let the mining men of England be careful how they invest their money in this country this summer, as I know there is a great deal of worthless property to be offered for sale in the London market that is coloured up by the experts for sale.

Central City, March 18. ——— ARGUS.

MINING IN UTAH—THE EMMA.

SIR,—My wish in writing you is that you should publish in the Journal a little about the mines in Little Cottonwood, to show the companies in London that there are men in this place who know better about mining than the Yankees they have got running some of their mines at present. The Emma Silver Mine is one to which I wish to refer. I am a Cornishman, and have been at this mine about two years, and working in this country and in England for the last 15 or 20 years, so I think I ought to know a little about mining. Well, some time ago, about two years I think, this mine was sold to an American company for 1½ million; shortly after they sent over to London and got a company to buy it for $5,000,000, so I think the Yankee company took in the English tight enough; and, as they are now working the mine, I do not think they will ever get out their money, for they have worked it just to a close, and are not running out 5 tons of ore per day on the average, yet they have got the mine full of Yankees and men that scarcely ever saw a mine, or know any more about mining than an infant, as shown by them throwing away thousands of dollars worth of the silver ore which might be saved if they were only to work it right. I do not like to see the property of English companies so thrown away, and I think those concerned in mines here should have men who know how to work a mine, not those who would bring it to a close before it is half worked out. I consider it is the Yankees who are fooling the English, and that is what I do not like to see. The superintendent has left; he was there about two years. I was working in the mine when he came there first, and he did not know the ore from any other kind of rock: he asked me and I told him, and showed him all about it. JOHN KITTO.

Alta, Little Cottonwood, near Salt Lake City, March 24.

EMMA SILVER MINING COMPANY.

SIR,—Passing over the history of our mine, and especially the leading incidents in connection with its transference from the late vendors to the present company, as matters which for many reasons had better be regarded as forgotten bygones, I have been, up to the present time, a steadfast holder, believing in the *bona fides* of the directors, and also the ultimate remunerative character of the mine. But I am bound to confess that the facts divulged at the recent meeting, as well as the subsequent policy of the board, have had a very seriously shattering effect upon my previous faith. For instance, as you correctly observed a few weeks since, the practice of withholding the weekly information from the shareholders is manifestly unjust, for, while we are kept hopelessly in the dark as to what is going on, it is clear that there are others who are fully alive to the importance of obtaining that information, and "work the market" accordingly. The notion of the chairman that the non-publication of weekly telegrams would tend to check undue speculation in the shares has proved completely erroneous, as anyone of experience in such matters saw at the time would be the case. The officials know well enough the nature of the information received from time to time, and it is not difficult to understand by what means it becomes known to certain members of the Stock Exchange; hence the fluctuations in the price of the shares. All this is going on among outside parties, while the shareholders—who, of course, are debited with the expense of obtaining the information—are kept entirely uninformed.

Again, rumour says that the purport of Mr. Attwood's report has been telegraphed to London, and received by the directors, but on account of its extremely unsatisfactory character it has not been published. It is only reasonable to suppose that some considerable time having elapsed since our new manager left for the mine a communication has been received from him. The shareholders, however, have not received a tittle of information.

For these and other reasons, which I need not now refer to, I think a special meeting of shareholders is imperative to determine upon an altered policy.

April 15. ——— A SHAREHOLDER.

MINES AND MINING.

SIR,—I am thankful to learn from a great many different, and even somewhat opposite, directions that my letter in the Journal of last week has obtained notice, and awakened the attention of practical men and investors to the topics to which I then invited the notice of your readers. I believe that all the questions I put were of interest to real mining men and solid investors in mining property; persons who are not mere speculators and gamblers in shares which often represent nothing. May I express the hope that intelligent, practical, and scientific men will follow up the subject, and afford more useful information than I have been able to convey, and at all events, pursue my attempt to bring the whole subject under the discussion of the public. That this subject cannot be over valued is made very intelligible by the "Memoirs of the Geological Survey," edited by Mr. R. Hunt, keeper of Mining Records. If these be reviewed for a series of years they will show the magnitude and importance of our mining interests, and prove how necessary it is for men of experience and intelligence to engage public opinion upon the subject. These records give us the mineral statistics of the United Kingdom in the aggregate, and those of every mineral district—Cornwall stands foremost among these, it is the great tin, copper, and to some extent, lead-bearing zone of the British Isles. To these products let us confine ourselves in the present letter.

Cornwall is not, comparatively, so rich in lead as in tin and copper; but taking Mr. Hunt's Statistics for 1869 we have the following results:—Cornwall returned in that year 6775 tons of lead, and in connection with that product 315,714 ozs. of silver. Larger amounts of lead were produced in other districts, as Yorkshire and the counties of South Wales taken together, but the proportion of silver was greater in Cornwall than elsewhere; and probably next to Cornwall is Cardiganshire and the neighbouring counties. The produce of Cardiganshire is very well worthy of especial notice. The lead yielded in the year referred to was over 6216 tons, but the silver was less in proportion than in Cornwall, having been a little over 66,000 ozs., not very much more than one-fifth of the proportion of silver. Flintshire, the near neighbour of Cardiganshire, is very productive of lead, but not at all so largely as Cardigan; the returns for 1869 were 3570 tons of lead, round numbers, with 30,617 ozs. of silver—a proportion tolerably near to that of Cardigan.

The value of tin raised in Cornwall in 1869 was not far from 1,000,000*l.* The quantity was, in round numbers nearly 14,000 tons. The value of copper produced in that year from Cornwall (still using round numbers) very nearly 300,000*l.* In Devonshire the tin produce was worth under 10,000*l.*, representing more than 127 tons. But the copper was greatly in excess of this, being about 93,000*l.* in value, representing about 25,000 tons. Taking all the metallic products of Cornwall together, they were worth 1,750,000*l.* Those of Devon were to the value of nearly 131,000*l.* The two great south-western counties together have yielded about 131,000 tons of metallic treasure, so as to realise close upon 1,500,000*l.*

Surely, Sir, so great an industry as this ought to have fair play. Is it too great and noble an interest to be jobbed and jerked away by sharedealers and speculators, who know nothing of such property, and could scarcely distinguish a mine from a mouse-trap. If the facts I state here be true, and you, Sir, know well they are, then I know your readers will do me the justice to admit that my series of queries in last week's Journal were opportune. At all events, every mining captain in Cornwall, Devon, and Wales, and every mining investor who really knows what he has been doing, will aver that it was time to put these topics in some form before the public. If I have evoked enquiry and discussion I shall feel that the duty which I have endeavoured to perform has not been in vain. Perhaps some abler hand will take up the subject in your columns, which will be to your satisfaction and the advantage of your numerous constituency. In another letter I will adduce facts to bear out what I have affirmed. THOMAS SPA

Gresham House, Old Broad-street, London.

N. ENNOR'S REMARKS AND ADVICE TO YOUNG ASPI... ON LEARNING NATURAL LAWS, AND WHO SHOU... THE MINE AGENTS—No. IV.

SIR,—I next take up the kind of youths who should be s... and brought up as agents: they should be active, aspiring, ... mix in no idle company—let them read in place of that—dr... little, smoke sparingly (if any), be diligent and ever watchful... think they have done enough or tire; let the book of Natur... be their thought by day, and it will be their dreams by night... a good rough book to make all entries in, carefully dated;... better—a second-class—book to enter into as their standard... enter everything as they find it, think and pause a time bef... enter their opinion, and then only in pencil, for fear they... from some other comparative thing of the like nature reason... it; watch all pits on lodes and surface workings, make ... the rock, the gossan, and composition on their book, with... and bearings, things which they may think trifling at the ... often prove of service as the mine deepens, take the princ... tents of all lodes, and never be sparing of entries in any ... are often useful in after days. Turning to lodes within ... or where theorists say they enter the *black hole*, I say to all ... dents spend two or three years learning the practical par... work, and manage, in all your underground progress, to ... own living—the right man in the right place is sure to ear... bread. You must be watching everything; move often ... mine to another, or as often as you think you have learn... Nature's book will reveal to you in the former; if anyth... turns up see it again, and note it down; manage to get into ... deep once productive mines as much as you can; it is not ... that you should work deep, but here you will learn the firs... Nature's real book; take *sections* of every lode, with dip and ... together with the nature of the rock and how it dips, wi... other intersection of lodes and cross lodes, slides and clea... their bearings, and what ore and about what quantity ... in the lode at each intersection, and the apparent direction ... came in from, and if all the ore came in from the same dir... from different directions; notice the quantity of water wh... lode brought in, and if they are formed from the apparen... of water; ore in atoms is often brought by water, and cas... lodes which have an affinity for it. Take (say) a ground pla... mines at about the levels where the most ore is made, kee... entered as near correct as you can; with this you have to tra... first leaf of Nature's book. When you have enough of one m... into another which was once a good mine, old if at hand, a... down all the same remarks as to how found, then compa... with each other and with your own views; make entry of your ... opinion; get as many mines of this class as possible, and e... as before. The old good mines are the most valuable lesso... found for forming the book of Nature. Class all that come ... alike together, then keep a second book of mines with not so ... intersections, but good ore, and notice how the ores form in ... and if by the same kind of intersections and bearings; the... mines which have had a deal of money spent on them with ... *ore*, but not sufficient to pay; take notice of copper mines ... lodes of copper and tin, and see if you cannot find out that ... regular tin and the other a copper lode, but with their inter... the tin and copper run across each other, in fact, they may ... pared to the oak and ash trees. I think you will find but ... long lengths of continuous lodes with no intersections wh... been very prolific; be careful how you recommend them ... must be carefully examined and laid down. N.

Hyde-street, New Cross, April 15.

TERRAS TIN MINE, AND ITS MANAGEMENT.

SIR,—Though possessing only a small interest as a shareh... Terras, I venture to express my regret at the indiscriminat... attempted to be thrown upon the late manager at this mine ... successors. We have received during the past year dividends ... ing to 15 per cent. on our shares, which I understand were p... of profits derived mainly from the working of the elvan at ... points, not only at the places where it crosses the lodes; ... attempts to prove that this working has been carried on at ... appear to be based upon a mistake, whereby outlay upon cap... count in the starting of the mine is charged against the return... is quite another question whether an immediately prudent ... was pursued by the directors in expending so large an amou... capital upon the very extensive permanent surface works; ... the course of a few years any shareholders who may now be in... to cavil at this procedure, will be likely to take a different v... it when they find that the returns do not repuire muleting for l... outlay in that direction, but are wholly available for dividen... believe the opinion expressed by a speaker at the recent meeti... March 26 is correct—that the whole of the elvan at Terras co... tin, so far as proved at present; but no means having yet be... vised whereby the richer and poorer qualities can be complete... criminated prior to the practical test of stamping, the late ma... ment appear to have acted rightly in not discarding the whole ... elvan stuff, but employing a ready method for treating large... tities of it in the cheapest and most effective manner. On o... casion on which I have had the pleasure of going through the ... with the late manager he broke pieces from the elvan with ... which to the eye presented no appearance whatever of cont... tin, but were proved by vanning them to yield tin in paying ... tities. Similar successful results appear to have been obtained ... elvan workings in other districts than that of Terras.

I am glad to notice an incidental tribute to Capt. Richard... perience, at the end of the valuable practical letter of Capt. P... which appeared in last week's Journal. The shareholders ... will have the gratification of receiving as good dividends und... new management as they have done under the old; and whe... results hitherto attained shall have been surpassed, it will be ... enough to begin to enlarge upon the mismanagement which has ... so satisfactory a return. Meanwhile, let us not forget the s... of our new Chairman at the meeting on March 26—"That forty... mine we have thus far done very well." A.

April 16.

TERRAS MINE.

SIR,—A man who has any love for his neighbour (and every... is bound by a Divine law to "love his neighbour as himself") ... feel regret at the result of this speculation. This tin work ... before the public, about three years ago, as something better ... *speculative* concern; it was said by the promoters, and particu... by a broker of Gracechurch-street, who came out of Noah's ... that profits were *certain;* that it was not to be ranked with ... nary mines of a doubtful character. It was alleged that the ... contained tin in such abundance that large dividends would certa... be made for many years to come. Many persons in the nor... England, misled by the specious statements contained in adver... ments, purchased shares at 3*l.* each—making 75,000*l.* for the ... —when only 1*l.* per share was paid up, or said to be paid up.

I am sorry that capitalists have been thus misled; it is not a ... a loss to them, but such disappointments militate against mi... in this county. I have heard that the broker referred to ... 13,000*l.* by transactions in the shares—the result of "puffing"

The company, or their agents, did wrong in working so long ... the elvan. The agents should have known early in the work... whether the quantity of tin was sufficient to pay or not. If ... been informed that if water-power could be applied to the ... instead of steam, the elvan would pay. But the lodes in the ... should have had more and earlier attention. I am sorry that ... company have drifted into the Stannary Court before the lodes ... been fairly tested, all the needful appliances being on the spot.

roperty comes to the "hammer" I suppose some person will ase with a view to a fair experiment on the lodes, which are to be relied on in general than elvan dykes for the production
R. SYMONS.
—*April* 16.

EAST TERRAS MINE.

I tried several times to induce the directors to meet, and to call a meeting ompany to decide on working the property, or winding up the company's he stubborn directors were immoveable. My object in desiring a meeting ompany was to advise a *sale* of the lease, in case we could not work, and procure assets to discharge some of the liabilities of the company, which ffered under the Limited Liability Act. I knew a gentleman who would urchased the lease if he could have had it a few months ago, but it is now it is of no value at present in his estimation. That being the case—conse- the failure of Terras—I shall no my express any desire for a meeting of ny. As to the directors, I may say that "they are no better than they
R. SYMONS.
c."—*Truro, April* 16.

HOME MINING.

"When things are high the public buy,
But when they're low they let them go."

—In looking over a few of your recent numbers I could not eing reminded of the truthfulness of the lines above, some- ggrel though they be. Things are apparently rather low present, and a considerable portion of the public seem to hof from mines. Why it is difficult to say. Some will tell is because of the scarcity of coals, or that the enormous of coal and iron companies created have engaged the atten- ose who under happier circumstances would have been interested in search- n, copper, and lead. There are people who do not scruple to say plainly, perhaps a little coarsely, that the public had a bellyful of mining last t fact, swallowed indiscriminately the good and bad to such an extent e ever since remained an intolerable load on the stomach, and has been n the market whenever an opportunity occurred, regardless of loss or cience. Some will remember how Radleigh Rood and Wheal Bang ran up ue of a few weeks hundreds per cent.; then followed a host of subsidiary Rods and Wheal Bangs, all having the same lodes (at least so it was said) them more than five or six miles from the parent bird. These had their many instances a short one), and are now some of them expiating their the Stannaries Court, from which they may expect probably to emerge in ing less than eight or ten years. In a short time the evil will cure itself, ust will be purged, and the atmosphere of mining rendered clearer. Then me to buy, just as the public, roused from its long lethargy, comes forward like a giant refreshed with wine. Those who detach themselves from the herd, and buy as the others throw their stock wildly about, are wise in peration, and will reap due profit. Home mining must improve, and that is the most *elastique* of industries, and is invariably the first to recover of our great panics. Let the wise, therefore, bestir themselves, and set oking up the good things that are to be found. This was done, I am told, engeance in the new Cardiganshire lead mine—Tyllwydd. The directors ery one to allot had to refuse scores of applicants, the market became hungry, e who had secured shares found it easy to dispose of them at a premium of to 10*l*. This is one of the soundest things brought out this year, and will in favour with the public. Then there is Boscaswell Downs, the shares of ot very long ago were dealt in at 5*l*. and 6*l*. They may now be picked up at ing less than 4*l*. The mine is very deep and very old, but has a great deal ry left. If the new capital is promptly subscribed for the mine can receive ecessary development, and is likely to do well. I never could understand res in Castle-an-Dinas should be obtainable below par. The whole capital han the sums often asked and obtained by promoters for bare setts. The ery on the mine is worth 3000*l*. or 4000*l*. if it is worth a penny. Under or- circumstances, after paying a dividend, the shares should have been at a premium of 100 or 200 per cent. Four dividends have been de- yet the shares can be had for about 35s., 40s. paid. South Carn Breas must buying; they are now paying costs, and expect to do much better in the quarter. Young lead mines like South Roman Gravels and Old Batholes require pointing out. Great confidence is reposed in the management, and res are quietly absorbed in the market. Rookhope Valley are worth noticing . The same remark applies to Van Consols, which may any day see a e. Devon Consols and Wheal Crebor are near neighbours, but how widely have been their careers. Devon Consols from the first took the tide that fortune; Wheal Crebor grounded on the way. Over 3*l*. per share has been p without, as yet, any return; the shares, however, command a high , and those who have had the courage to hold on must have been well d. Under any other system than the cost-book this mine never could have ost at present the cost-book is under a cloud, notwithstanding all the rich mines work under it. There can be no question as to its being the most for mines, if equitably administered, and unless more mines (limited) successes it will be largely resorted to again.
LOOKER-ON.

FRANK MILLS MINE.

In reference to the letters on this mine which have lately appeared in the much may be written of a nature to render holders of shares perfectly con- their prospects. The reports from practical men like Capts. J. Cornish, ab. N. Addems, S. Bailey, J. Nicholls, and R. Goldsworthy tend so over- ly to confirm these hopes that I will only venture to make a few observa- ll worthy of the notice of shareholders. The offices of this company being , it follows that information, now rather eagerly sought, is not always so ainable for outsiders as if the company's offices were in London. I, there- ition some facts:—1. There are tramways already laid in the mine, avail- the carriage of the spathose iron, found in unlimited masses, all of which te order.—2. It is stated fully that upwards of 800 tons of this ore can weekly with great ease.—3. If this iron ore brings but 10s. per ton profit with iron at such prices as at present, 70s. per ton more near the figure), 0*l*. per week profit=20,800*l*. per annum, on a capital of 5000*l*., if we call ntrance about 1*l*. per share.—4. It appears certain that the mine will turn out a the deeper levels, especially in the improved channel of ground in the en ch.—5. The lodes being found with iron is considered a proof that they will ery rich.—6. The western lode, which has not been seen south of the shaft, g whole for a distance of just 200 fms., and is now believed to be fully as re as the eastern lode; and operations for opening up this part of the sett to be vigorously and economically prosecuted, by driving the 45 and 65 fm. ith all speed) some 40 or more fathoms further south, and cross-cutting to en lode.—7. In the north part of the mine there are fair reserves, and productive stoping ground; and the 100 end promises much.—8. The the bottom of the mine are improving, and the lodes forming a junction a per, which will soon be hit.—9. The Teign Valley Railway is being rapidly ed, and the ore can be dispatched direct from the mine (by its tramways) ere trifle.—10. The ground below the 70 has very greatly changed, together character of the lode itself (iron having changed for lead), and as good re- ever are anticipated.—11. Enormous deposits of lead are expected under —12. If the iron ore should prove worth 70s. per ton (as suggested), the of the mine would then be, without the lead ore being calculated, equal to a pretty little speculation for an investment of 5000*l*., or 1*l*. per share, calculations of rising value in iron, or, indeed, lead. A week's time will, stimation, change the position of Frank Mills—I consider one of the best the market just now.
SHAREHOLDER.

TYLLWYD MINE.

Being slightly interested in this valuable property, and knowing some- the district, I can candidly recommend it as a highly promising invest- all interested in mining. The position and geological formation of the n hardly be surpassed. Three lodes, which have returned immense profits joining rich mines, pass through the sett, and have been proved to a good lead, it should be borne in mind, is not subject to the same fluctuations pper. It is now remarkably scarce; the present prices are about the ever known, and are likely to go still higher, as the prices received from have been gradually falling off for a long time. A general opinion seems at mines producing lead will be in especial request this year. As it is, is nearly all are well supported. A careful investment in several of the gressive lead mines promises to be usually remunerative. Tyllwyd, ans Gravels, and Old Batholes are likely to attract a good deal of atten- ing the year.
M. A.

GREAT TIN WORKS MINE.

EAR HEDITER,—The people here are teling that this ball es goen to work. , I have been a mainer all my lifetime, and worked en lots oh balls, good , shalo and deep, and I do knaw a good deal about this. I do caall it a ble ball for ane compane to work. The back oh the grate load was full oh ead here, for doun en the botom level, I recken thea caled it the 45, for we ould mainers do knaw that Ire do ride a good hoss, and this es proved same doun opon hes ears, and hes tail cocked up. I spose master Hedi- hardly knaw what I mean by this. Why a good hoss mean a grate couse ard under Ire or mundick, and you see by the ould managar's reporrt that t was duble so good doun in the botom as upward, and we mainers do say es only now getin doun on the minerol, and this es what I mean by the ears and tail now apearen. Capen Broun only came here to manage after mpane had spent all thear mone, and everything was en such mes and caudle oh repair, and the ould rods contenuale braikin, and no mone to be had to ; the management before Capen Broun's was as bad as cud be. If you things better, the main was shut up. I never sead such shamefull thing en knaw much about Stomping Tin many of your reeders do, and I can say for that here thea worked thear Stomps with the whole length oh a new head the bottom oh the grate plate; and wear do you spose the tin would be found eaten to death like this, why no rid rever in the world would compare with e slime here caaled good for nothen! a litle forten was atterwards goat out and every bit of it was carted away to another ball to dress. Mind, Maaster , I dont blame Capen Broun, for when he came he found everything bad, ould get no mone to make it better. So I say this young ball was mudered; am now waiting to put my hand on the mane of that animol I spoke oh , and no more of your ould deep mains for me, for before the hoofs are my day will be gone. I have already done with Engen shafts and grate ork bargens, and shall be satisfied with a Tribute Pitch, oh which thear are to work epon as soon as the water is out.
A OULD TRIBUTER.

WHEAL BARNARD SILVER, TIN, AND COPPER MINING COMPANY (LATE THE QUEEN MINE).

—I beg to report that the wreck of the silver shaft is cleared to 23 fms. from on, or 7 fms. from the bottom of the mine. Permit me also to intimate, for couragement of those who are ascending the steep and rugged hill to suc- legitimate mining, that the best way to make sure of assistance is to assist . But a few days need now elapse when I shall have the pleasure of whirling into silver ore worth thousands of ounces of silver to the ton, and those who and faith in me to the last will soon reap their reward.
THOS. J. BARNARD.
Abey Mount, Tavistock, April 17.

[For remainder of Original Correspondence see to-day's Journal.]

The Prize Essay—Practical Mining.

No. IV.

DRAWING OR WINDING.

Owing to some miscarriage through the post the amended proof sheets of this article did not reach us last week in time for insertion, and the following corrections are consequently found necessary.

At the foot of the first column the remarks should have read thus:—"The details of colliery underground winding apparatus consist of the usual *Drums* or *Cages* attached directly to the engine, or by means of intermediate toothed gearing for the increasing of either the speed or power. These drums are generally made of wrought-iron, but sometimes cast-iron and wood are partially used; they are made to suit the special requirements depending on whether chain or flat or round rope, either of hemp or wire is used. *Efficient Brakes* for checking speed. *Pulley Sheaves* and *Rollers* for conducting the chain or rope, and for changing its direction; these are usually made of cast-iron with wrought-iron axles, and are of all sizes and forms suitable for the kind of rope or chain used. *Clip* and *Wedge Pulleys* are capable of great application in connection with wire rope under certain circumstances, as on double inclines and for working endless ropes, and may be conveniently substituted in the place of drums. *Rope* and *Chain* will be noticed in drawing through the shaft."

Fowler's Clip Pulley.—Makers, Messrs. John Fowler and Co., Leeds. Prices, 4 ft. diameter, 35*l*.; 5 ft. ditto, 35*l*.; 6 ft. ditto, 60*l*.; 7 ft. ditto, 75*l*.; 8 ft. ditto, 90*l*. For pulleys of larger diameter than 8 ft. special estimates will be given.

The remarks on rope manufacturers at the head of the third column should have been as follows:—"Messrs. E. H. Hawke and Co., Scorrier, are extensive manufacturers of hemp and wire ropes, and the introduction of special improvements enable them to supply ropes of very superior manufacture. We notice also as amongst the best makers of every class of hemp and wire ropes, Messrs. John Stephens and Son, Falmouth; Messrs. Craven and Speeding Brothers, Monkwearmouth; Messrs. William James Glover and Co., St. Helen's, Lancashire; Messrs. Garnock, Bibby, and Co., Liverpool; Messrs. Warrington Wire Rope Company, Warrington, Flint; Messrs. John and Edwin Wright, Garrison-street, Birmingham."

MAN ENGINE.

This is a contrivance for raising and lowering miners in shafts, and has long been in use in Cornish mines. It is very much safer than the cages used in the collieries for the same purpose. It consists of a single rod, or a pair of rods, reaching through the whole depth of the shaft, and having a reciprocating motion given them by a steam-engine. Steps or projecting pieces for the miner to step on, are fixed to the rod or rods, at short distances from each other. In the case of a single rod corresponding steps are fixed in the shaft on which the miner steps when the rod has completed its upward or downward stroke. The man-engine formerly at work at the United Mines, Gwennap, consisted of a pair of rods moving in opposite directions, but in most other mines in which the contrivance is used a single rod only is adopted. The stroke of the rod varies from 8 to 14 ft. Prizes have been offered by the Royal Cornwall Polytechnic Society for the invention of some less expensive but equally safe contrivance. but through offered for years nothing better has yet been introduced. Particulars of the cost of man-engines may be obtained by applying to some of the principal Cornish founders.

SPECIAL MINING MACHINES AND TOOLS.

DRESSING.

The appearance of the dressing-floors of metalliferous mines has completely changed during the present century, but more especially within the past 20 years, by the substitution of machinery for hand labour, and which have resulted in the accomplishment of the work at greatly reduced cost. In some cases machinery has been attached to old arrangements without any marked alteration in construction being observable, while in other cases there has been a retention of the same principles, but a complete change of form and detail. The changes that have been made in improved modes of dressing have not been confined to ores of a particular kind, but are manifest, though not to an equal degree, in ores of every description. The more complicated treatment which tin ores require generally, arising from the necessity of complete separation of the granular ores from the refuse mineral substances with which they are associated, involves more elaborate arrangements, and more extensive dressing apparatus, than other ores; consequently here we find that the most ingenious appliances have been devised, and more largely applied in practice, than have been observable in the dressing of either lead or copper ores. In the treatment of copper and lead it is frequently necessary with ores of a disseminated character, and the slimes produced in their ordinary dressing, to use some of the appliances which belong more particularly to tin-dressing, from their almost exclusive employment for that purpose. From such occasional use we may reckon those contrivances to be general to the three kinds of ores. In addition to these there are those which are exclusively applicable to the dressing of tin ores, and others equally applicable only to the dressing of copper and lead. Hence we have to consider—

1.—General dressing machines and tools.
2.—Machines and tools used only for tin-dressing.
3.—Machines and tools used only for copper and lead-dressing.

GENERAL DRESSING MACHINES AND TOOLS.

SPALLING SLEDGES AND HAMMERS.

We have mentioned sledges and hammers used for driving boring tools under the head of excavation, but tools of this kind are in common use for breaking up large stones and lumps of ore for sorting previous to its further reduction by the stamps or crusher. They are used in three or four different sizes. The heaviest kind of sledge for the rougher work varies from 12 to 15 lbs. or more in weight; the next sizes vary from about 7 lbs. to 2 or 3 lbs. in weight. They are made on the mines, either of cast-steel or best iron steeled, but the former is preferred. The hilts for these tools are usually of stout ash.

MACHINES FOR STONE BREAKING.

Machines have come into use during the past few years for superseding manual labour in reducing stone and mineral to various sizes. One opinion only seems to exist respecting the mechanical efficiency of the greater number of them, but there are differences of statement respecting their economical value, some mine agents alleging that their use is attended with a greater or lesser saving in labour cost, while others have found their work could be done as cheaply by hand labour. There can be no doubt as to their great service in districts where labour is scarce. It should not be forgotten in considering the respective economy of hand and machine labour for breaking mineral, that by the use of machines the classification which accompanies hand-spalling is impracticable, and in cases where the ores are poor large quantities of stuff which by the old process would have been thrown aside as worthless are subjected to the different operations of dressing, and not only entail this additional labour and expense, but cause actual waste by absorbing and carrying away valuable orey matter. The best known stone-breaking machines in use are Blake's, Archer's, and Newall's.

Blake's Stone-Breaker.—This is the most commonly known. The stone is broken between a pair of jaws, one fixed, and the other vibrating on a centre. The latter is fluted on the breaking face to correspond with the fixed jaw, the grooves of which are opposite the ridges of the moveable jaw. Every revolution of the crank causes the lower end of this jaw to advance towards the fixed one about $\frac{3}{8}$ths of an inch and return. The stone falls lower to fill up the space caused by the backward movement, and is then ready for the next bite, and so on until the broken material drops out at the bottom. The machine performs from 200 to 250 revolutions per minute, and may be driven by steam, water, or horse power. The stone-breaker may be had attached to an engine, or separately. The only maker in Great Britain and Ireland is Mr. H. R. Marsden, Soho Foundry, Leeds.

Size.	Product per hour to size of road metal.	Power required.	Total weight.	Price without engine.	Price with engine.
6 × 4	1½ cubic yards.	2 H.-P.	2 tons.	£ 75	£110
15 × 7	4½ „ „	6 „	6 „	180	250
24 × 12	8 „ „	10 „	14 „	350	450

Archer's Stone-Breaker.—This has a roller with fluted corrugations, working against a fixed jaw, which has flutes at right angles to those on the roller by which the stone is broken into uniform pieces. The space between the roller and the lower end of the jaw can be adjusted to break the material to any size. Elevators are attached to the machine to raise the broken materials and discharge them into carts and trucks. Makers, the Dunston Engine Works Company, Gateshead-on-Tyne.

Size.	Quantity per day.	Power required.	Weight.	Price.	Price with elevators.	Price of boiler & engine.
10 × 5	30 tons	5 H.P.	2¼ tons.	£110	£132	£140
15 × 7	50 „	7 „	5 „	165	198	176
24 × 12	80 to 100	10 „	7½ „	330	374	258

An improved form of this machine has been designed by Newall, which gives it a better feed arrangement, and dispenses with all pulleys, gear, and belts, except the one connecting the engine. Both these machines can be had with engine on the same frame.

Newall's Stone Breaker.—This consists of two jaws—one fixed, and the other working against it. A steam-cylinder is attached over head, with a piston-rod working through both covers; the lower end of the rod actuates the back jaw, whilst the upper end is attached to the crank-shaft of the fly-wheel. Makers, Dunston Engine Works Company, Gateshead-on-Tyne. Special estimates are furnished of prices.

STAMPS.

The past few years have been marked by the numerous attempts to improve stamping machinery, which in many cases have consisted as much in the modification of old arrangements as in the adoption of any new principles. That the advantages claimed for the many recent machines have not been sufficiently established is evident from the fact that the leading mine managers of Cornwall still continue to erect the old stamps. This has brought on them the charge of prejudice in reference to innovations, but thoughtful men will think they act with commendable caution. Men who are so eminently qualified in all that appertains to the execution of mining work, and in many instances holding heavy interests in the properties they superintend, are not likely to be induced to make any very great changes unless certain advantages will accrue therefrom. What is being looked for is positive proof, after lengthened trial that the new stamps are capable of stamping the work equally as well as the old stamps; that they show durability in construction, and that the stuff is stamped more cheaply. As soon as these points are demonstrated in any machine it will be seen that Cornish mine managers will welcome its adoption.

The stamping machinery best known are the following:—

I. STAMPS WORKING BY GRAVITATIVE FORCE.

Cornish stamps, revolving stamps, Walker's stamps, Ennor's stamps, and Prosser's stamps.

II.—STAMPS WORKED ON THE PRINCIPLE OF THE STEAM-HAMMER.

Chatwood and Sturgeon's stamps; Brinjes' stamps.

III.—STAMPS WORKED BY CRANK WITH CONTRIVANCES FOR INCREASING THE FORCE OF THE BLOW.

Husband's stamps; Willoughby's stamps.

We do not think it necessary to give full details of the construction of the above stamps, but shall simply make a few general statements of the reported effectiveness of the most prominent.

The Gravitation Stamps, in universal use in Cornwall, though very effective, is exceedingly heavy and cumbersome, and indeed must be if it is to succeed, since it is by the fall of heavy masses of metal that the mineral is pulverised. To reduce the weights of these moving parts would necessarily be to diminish the efficiency of the machine, an increase in the fall being impracticable except within narrow limits. Each head, with lifter, usually weighs about 6 cwt., and is raised from 60 to 70 times per minute, stamping in 24 hours from 15 cwt. to 1 ton, according to the nature of the stuff. Great power is required to work this stamps, and the loss by friction is considerable. It is worked by steam or water power. When a large number of heads have to be driven a steam-engine is required, except great streams of water can be commanded. Water-power in the Cornish mines is usually limited to the working of detached stamps.

Capt. Tregay, of Redruth, is the inventor of an improved coffer for facilitating the discharge of the pulverised ores, whereby the quantity of slime is reduced, and the stamps rendered capable of doing a much greater quantity of work, especially in the treatment of the softer kinds of ore. Various modifications have been made on the Cornish stamps from time to time, with a view of rendering it more effective. To prevent unequal wear of the head a revolving motion has been given it, but this is rarely adopted at home; stamps with revolving heads are principally made for exportation.

To reduce the friction, which considerably augments the power necessary to drive it, various ingenious contrivances have been devised. The arrangement of Mr. Walker has been very favourably noticed. It differs from the Cornish stamps in having the cams arranged on both sides of the lifter, or stamp-rod, and the true vertical position of the rod is ensured during the entire upward movement. In Prosser's stamps the lifting cams act intermediately upon levers instead of upon the rods, and the head is rotated by gearing at the upper part of the rod: it has facilities for changing the heads and grates by the stopping of a single battery only. Mr. N. Ennor has some arrangements under consideration for increasing the efficiency of gravitation stamps.

The following are makers of the Cornish stamps:—Messrs. Williams, Perran Foundry Company, Perranworthal; Messrs. Harvey and Co., Hayle; Messrs. West and Sons, St. Blazey; the Tuckingmill Foundry Company, Camborne; Messrs. Tangye Brothers, Birmingham; the Sandycroft Foundry Company, Sandford, near Chester.

Prices of the Cornish stamps, and the engine necessary for driving them, may be had on application to the above makers.

We give the following particulars of the prices of the principal parts of the Cornish stamps, depending greatly on the fluctuations of the iron market—axles, 15s. per cwt.; axles, turned and fitted, 18s. per cwt.; short and long shank heads, 11s. and 12s. per cwt.; heads without shanks, 10s. per cwt.; cams, 12s. per cwt.; guides, 13s. per cwt.; bushings, 15s. per cwt; grounds, 10s. per cwt.; grate plates, 13s. per cwt.; all cast-iron work. Tongues, steeled, 7½d. per lb.; not steeled, 7d. per lb. wrought iron. Stamps grates vary considerably in price, according to their size, thickness of copper, and the number of holes per square inch. The usual cost is from 14s. to 18s. per dozen. Makers, Messrs. J. and F. Pool, Hayle; Mr. H. T. Launder, and Mr. W. H. Launder, Redruth.

Makers of Revolving Stamps.—All the above firms.

Walker's Central Lift Stamps.—Particulars of this stamps may be had by applying to Mr. John Walker, 12, James-street, Old-street, London.

Prosser's Stamps.—Maker, Mr. Nicholas Sara, Penryn Foundry, Penryn.

Ennor's Stamps.—Information respecting this stamps may be obtained of Mr. Nicholas Ennor, 36, Hyde-street, New Cross.

II. *Stamps worked on the principle of the Steam-Hammer.*—Messrs. Chatwood and Sturgeon introduced a stamps on this principle in 1870 at Goonbarrow, but its use has been discontinued. We believe, however, a further trial of the machine is contemplated. Messrs. Brinjes sent a machine on the same principle to West Jewell, Gwennap, about two years ago, but for the want of sufficient boiler-power it worked only a short time. It is to have a further trial at the same mine shortly. The impending trials of both these stamps will test the efficiency of the steam-hammer for stamping purposes.

[Messrs. Brinjes' stamps has received the second trial at West Jewell, but was not found at all economical, and is now no longer used.]

III. *Stamps worked by crank with contrivances for increasing the force of the blow.*—The stamps receiving the greatest share of public

attention at the present time are Husband's Pneumatic Stamps, and Willoughby's Spring Stamps. In Mr. Husband's stamps each head has a piston working through an air chamber, and attached to a crank; air is compressed in the top of the chamber by the upward stroke of the piston, and the momentum is thereby considerably augmented. The most economical speed is about 150 blows per minute, 5 to 6-horse power being required per head, and the weight of the head and piston-rod is about 310 lbs.; when in incessant work the head is stated to last about three weeks. When at New Rosewarne we were informed that the two heads then at work there easily stamped 15 tons in 24 hours through a 24-hole grate; the economy of this stamps could not be ascertained, as the buildings were in an unfinished state, and the engine not on duty. The Pneumatic stamps is at work also at Wheal Lucy, Hayle, Park of Mines, and Carn Galver.

Mr. Husband says that as far as wear and tear are concerned he will undertake to keep the pneumatic stamps in repair for less money per ton stamped than it costs for keeping the old stamps in repair for the same work. Several of these machines are being constructed for Australian gold mines. The fullest particulars respecting these stamps may be obtained from the managers and engineers of the above-mentioned mines, or from Mr. Husband, Hayle. At New Rosewarne the cost was 80*l.* per head, and the 17-in. horizontal engine employed, and the four heads, cost about 650*l.* without boiler. Makers, Messrs. Harvey and Co., Hayle. London Office, 115, Gresham-house.

Willoughby's Patent Spring Stamps.—In this machine a strong spring gives the momentum to the blow. Each pair of heads has a separate crank-shaft, so that in case of casualty only the pair requiring repair need be thrown out of gear; the two heads require 4-horse power to drive them. The length of the stroke as delivered from the crank-shaft to the spring is 12 in., but by the intervention of the spring the actual stroke varies with the quantity of stuff in the coffer from 20 to 24 in.; the spring enables the stamp-rod to adapt itself to the height of the ore in the coffer. The head, with the rod, weighs about 3½ cwt., and is delivered with a force equal to that of a 12-cwt. steam-hammer. Each head gives about 125 blows per minute, and is stated to be equal to 8 or 10 heads of the old stamps. Several heads are at work at Terras Mine, North Cornwall.

Willoughby's Stamps.—Makers, Messrs. Willoughby Brothers, Plymouth. Price, two heads in coffer, 160*l.*

APPLIANCES AND METHODS OF ROASTING ORES.

The recent lecture by Eugene N. Riotte before the Polytechnic class on the subject of Roasting was a very interesting one, and we regret we cannot give it in full. A synopsis will, however, amply repay perusal. The lecturer commenced by saying that the process of roasting was the fundamental process by which ores and metallurgical products are prepared for beneficiation, and, of course, the latter cannot give the desired results if the roasting has not been properly performed. Roasting, in the mildest sense of the term, means to effect a chemical change by the application of heat without smelting.

OXIDISING ROASTING.—If the ores to be treated contain combinations of sulphur, antimony, and arsenic, and we intend to oxidise the metals, and obtain them either as oxides or in part as sulphates, we call this oxidising roasting. Such, for instance, is the case in the roasting of gold-bearing pyrites of iron, preparatory to the extraction of gold by Plattner's process, with chlorine gas. Here we want the iron completely changed to peroxide, so that the presence of a sulphuret or sulphate would be injurious to the result of the chlorination process. As an example, when we want a part of the metals left as a sulphate, Mr. Riotte mentioned the roasting of silver-bearing copper matte in Mansfield. The matte is subjected to careful oxidising roasting, and the metals are left as oxides, except the silver and a small part of the copper, which, at the end of the operation are in the form of sulphates, and subsequently leached in hot water. This process is executed with such exactness that only about 1 per cent. of the silver is lost.

REDUCING ROASTING.—Sometimes it is desirable to reduce certain metallic salts, viz.—Sulphates, antimoniates, and arseniates, which have been formed during oxidising roasting, and change them as much as possible into oxides. This is done by mixing finely pulverised coal with the charge, by which the sulphuric acid is reduced to a sulphurous acid and the arseniates to metallic arsenic, which is volatilised. This we call reducing roasting. This method is used, for instance, in roasting copper ores containing arsenic and antimony, in order to remove these impurities.

CHLORIDISING ROASTING.—If it is necessary, on account of the following modes of extraction, to change certain metals into chlorides by roasting with the addition of salt, we have a chloridising roasting—an instance is the roasting of silver ores for amalgamation or lixiviation.

VOLATILISING ROASTING.—In some cases it is necessary to drive off certain substances, as hydrate water, sulphuric acid or carbonic acid, quicksilver, &c., which we speak of as volatilising roasting. This is done, for instance, where carbonates of iron are prepared for reduction in a blast-furnace by roasting in shaft-furnaces.

HEAP AND KILN ROASTING.—The oldest and simplest mode of roasting is roasting in heaps. Here sulphuret ore or matte is piled in pieces on a bed of fuel, which ignites the sulphurets. Of course, this method can only be used where a partial roasting is required. This is very often the case when sulphuret ore or matte is prepared for smelting, and the object in view is to collect certain metals (mainly copper) in a matte, and dissolve others, as iron, as oxides in the slag, or to concentrate the matte. In many metallurgical works it is found advantageous to manufacture sulphuric acid from the sulphurous acid which is formed in roasting. In this case the ore is roasted in kilns, from which the acid fumes are conducted to the lead chambers. From the kiln there is only one step to the—

HEARTH AND SHAFT FURNACES.—Roasting in the furnaces is effected in two ways. Either the ore and fuel are charged in layers, or the furnace is heated by fire-places. The process is more complicated where pulverised ores are to be treated, and exact results have to be obtained as to certain chemical changes, upon which the operation depends. The hearth-roasting furnaces were, until recently, the only ones in use, with their innumerable modifications. The heating of the charge is either effected directly by the flame from the fire place (reverberatory furnace) or it is effected by heating the hearth and arch from the outside (muffle furnace). The latter form is used when the gaseous and volatile products of roasting are to be utilised, as in the instance of roasting sulphurets for the manufacture of sulphuric acid. Another instance of the use of the muffle furnace is in the roasting of arsenical pyrites to obtain arsenious acid. Sometimes the muffle and reverberatory furnaces are combined, and the bottom of the muffle forms the arch of the reverberatory furnace.

ROASTING ON HEARTH-FURNACES.—From the construction of furnaces it follows that roasting requires time, labour, and skill. In order to roast a considerable amount of ore in a reverberatory furnace the charge must be spread several inches high; consequently, it takes not only time to bring it to a roasting point, but considerable stirring is necessary to bring the particles to the surface. Another disadvantage in the construction of this furnace is that the ore near the fire-bridge is exposed to a higher heat than that near the flue. In order to ensure uniform roasting it is necessary to shift the charge several times. Great care and judgment are required in regulating the heat. If the heat is too high in the beginning the ore even melts, and forms lumps, which are difficult to destroy, and are imperfectly roasted at the end of the operation.

PARKER'S FURNACE.—The first attempt to do away with the manual labour of stirring was made about 20 years ago by Parker, in England, who constructed a circular reverberatory furnace, with horizontal iron stirrers, fastened to a vertical revolving shaft. These furnaces, however, have not been generally introduced, for the reason that the machinery not only gets out of order, but the roasting itself is not so perfect as desired.

GERSTENHOFER'S FURNACE.—It was left to Gerstenhofer about 11 years ago to invent a roasting-furnace, the construction of which was based on an entirely new principle. In Freiberg the smelting-works received quantities of concentrated sulphurets of iron, small amounts of silver, and copper more or less finely pulverised. There being difficulties in the way of roasting these in either kiln or muffle furnaces to make sulphuric acid, Gerstenhofer devised a furnace for treating them, which is based on the principle of free fall, and which was soon introduced in the principal metallurgical works in England and on the Continent. It was, however, soon found to be available only within narrow limits. The roasted ore stuck on the terraces, fell down in layers, and obstructed the furnace. This is also the case when roasting with salt is attempted. It was also found that when complete desulphurisation was essential the furnace was not satisfactory, for reasons not difficult to discover. To accomplish a perfect roasting, the roasted ore must be exposed at the end of the process to a high heat. To do this by adding fire-places to the furnace was found impracticable. The conditions, therefore, under which the Gerstenhofer furnace can be used are as follows:—First, the substance to be roasted must carry sufficient sulphur to generate a roasting heat; second, the roasted ore must have no tendency to "sinter;" third, it must not be required that the charge should be perfectly desulphurised. This furnace is mainly used to roast pyrites of iron and copper ore and matte, in making sulphur acid, when perfect roasting is not required. As the subject of cheap roasting is an important one in our mining regions, it is no wonder that innumerable mechanical roasting furnaces have been brought before the public. Leaving out all those which are based upon entirely theoretical ideas, and have never accomplished any practical results, we may classify all efforts in this direction under two heads—cylinder and shaft furnaces. Of the former, it is only

BRUCKNER'S FURNACE which has accomplished good results, and is of practical value. This furnace is not continuous working. All ores which have a tendency to "sinter" must be excluded from the furnace; in other cases I can recommend it heartily for works of small capacity; all other furnaces which are continuous working give unsatisfactory results where complete desulphurisation, or a thorough chlorination, is required. The ore passes through the cylinder too quickly, is not sufficiently exposed to oxidising influences, and in most cases is discharged in layers, containing imperfectly roasted ore. Of the shaft-furnaces we must mention the

WHELPLEY AND STORER AND KEITH FURNACES.—Those who understand the principles of roasting will understand at once by seeing this furnace that the construction is based upon a false principle. The ore enters the furnace where it is hottest, and drops where it is coldest. For good roasting it is essential that the temperature at the beginning should be low, and at the end high. In this furnace the ore remains too short a time, the fall being accelerated by the downward direction of the draft. The Keith furnace is liable to the same objection. This latter furnace was introduced about nine years ago in Colorado for roasting gold-bearing sulphurets.

THE STETEFELDT FURNACE.—While residing in Austin the chloridising roasting of silver ore attracted Stetefeldt's special attention, and he became convinced that the old reverberatory furnaces would be superseded by a cheaper and more perfect mode of roasting. He found by a few experiments that silver ores could be chlorodised with the best results if a mixture of ore and salt were allowed to drop through a shaft, heated by fire-places near the bottom, against the rising current of hot gases. Here all the conditions for a good roasting are given. The ore enters the shaft where the heat is lowest, which heat increases as the ore falls. The gases formed by the roasting—sulphurous acid, hydrochloric acid, chlorine, and volatile chlorides—surround every particle of the ore, and materially effect its desulphurisation and chlorination. The upward motion of the draft prevents the ore from falling too fast. At the same time, the heat is utilised better than in any other furnace. As the draft in the shaft is very strong, the finest portions of the ore do not drop down the shaft, but escape unroasted in the rising gases through the flue. To roast the dust a fire-place is constructed in connection with the flue. The speaker here described the Stetefeldt furnace, and spoke of its general use.

A number of other furnaces for chloridising roasting which have been brought before the public are but mere modifications of the Gerstenhofer, Whelpley and Storer, or the Stetefeldt.

The lecturer closed by considering the chemical changes which took place in chloridising roasting, those cases where ores have to be roasted before amalgamating, and stated that, although he had been asked to deliver a lecture on metallurgy and local adaptation of roasting and smelting furnaces, he had come to the conclusion that it was impossible to concentrate so much matter into one lecture without treating the subject superficially.—*Mining and Scientific Press* (San Francisco, March 22).

THE CHEMISTRY OF THE MINE.

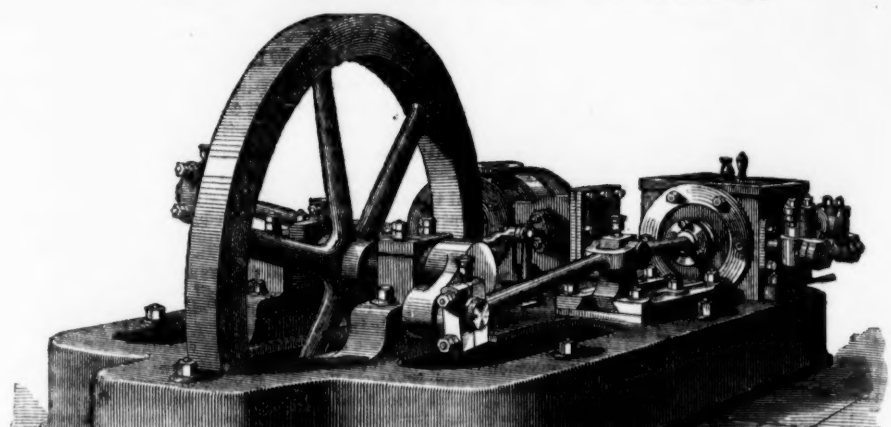
Under an arrangement with the North Staffordshire Institute of Mining and Mechanical Engineers, Dr. Hill, F.C.S., of Birmingham, is delivering a course of lectures on "The Chemistry of the Mine," at Stoke Town Hall.

Mr. ROBERT HEATH, who presided, said the subject upon which Dr. Hill was about to address them was one deserving the attention of the general public as well as those engaged in mining, and everything relating to mining would be listened to with far greater attention now than two years ago. He hoped that the gentlemen present who were connected with mining would profit by the lecture which they were about to hear. He hoped they would give attention to the lecture, and endeavour to gain information which would enable them to work mines more safely than they had done hitherto.

Dr. HILL commenced by observing that "The Chemistry of the Mine" was a subject of great magnitude and importance, but though its magnitude was so great, if they were strictly to define it they would find that it was limited to the study practically of only three bodies, including fire-lamp, which was sometimes so fatal to colliers, and which in reality was composed of two other bodies—carbon and hydrogen. But they could not study them without also studying the chemical composition of the atmosphere. Before introducing the study of carbon, hydrogen, and fire-damp, he proposed to occupy their attention with the study of the physical and chemical properties of the atmosphere itself, without which the study of fire-damp would be altogether impossible. The atmosphere was the medium of all ordinary combustions and explosions. It was a globe of gas which entirely surrounded the earth, similarly to the manner in which the rind surrounded the central part of the orange. That the atmosphere was material was easily proved by the fact that it occupied space to the exclusion of other matter. Thus, an inverted tumbler might be immersed in water without becoming wet in its interior; water could not be poured into a bottle through a tightly fitting funnel; neither could a well-fitting piston be forced to the bottom of a closed cylinder, because in all these cases the vessels were occupied by material air, and if they were to be filled with any other matter the air must first be displaced. Being material, the atmosphere must have weight, and having weight it must exert pressure. A wine glass perfectly filled with water and covered with paper might be inverted without spilling its contents, because the pressure of the atmosphere on the under side of the paper was greater than that of the small column of water on the upper side; these facts were illustrated by experiments. Dr. Hill went on to say that it was Galileo who first pointed out that the reason water could not be raised to a greater height than about 32 feet in a common pump was that the pressure of the whole atmosphere was equal to the weight of a column of water only about 32 feet high; and Torricelli confirmed the correctness of this view by showing that the mercurial column of 30 in. high was of just the same weight as the column of water 32 feet high, so that the column of water and mercury respectively balanced a column of atmospheric air, because they were all three of the same weight. But if wine were introduced into a barometer tube it would, owing to its being lighter than water, stand at a height of 34 or 35 feet. After giving several illustrations of the pressure exerted by the atmosphere, Dr. Hill directed attention to the chemical constitution of the atmosphere, which he described as a complex mixture of gases, the three principal of which were oxygen, nitrogen, and carbonic gas—that gas which was known to be so fatal to miners, and which often suffocated persons who might have escaped burning at the time of explosions—and he proposed to deal that evening principally with the former—oxygen. Dr. Priestly, of Birmingham, first discoverer of oxygen, 99 years ago, by heating oxide of mercury, called red precipitate. It was the most abundant of all elements, an essential constituent of every plant and animal. Speaking of the physical properties of oxygen, he said the gas was invisible, colourless, tasteless, and tinodorous, permanent, never having been liquefied; it was heavier than air; it was soluble in water to the extent of three volumes in 100; and its presence might be known in several ways. Having exemplified the energy of combustion in an atmosphere of pure oxygen, he gave illustrations to show that the temperature at which different substances combine with oxygen to take fire widely varied. He also showed by minute divisions greatly disposed bodies to take fire even without assistance from external elevation of temperature. It was, he said, seen in metals when in the so-called pyrophoric condition. A lump of lead was only very slowly oxidised by exposure to the air, but when very finely divided it became pyrophoric and took fire immediately on contact with the atmosphere. The same was true of metallic iron in a state of minute division. The experiments relative to the finely-divided iron was not so successful as the others. Dr. Hill observed with reference to the minute division of iron, and the experiment with it, that it might be regarded as an example of spontaneous combustion, which was not confined to metals, but extended to other porous matters—hayricks, greasy tow, oiled silk, charcoal, and similar bodies which latter they knew was prone to spontaneous combustion. The specimens exhibited showed how fine division effected these phenomena, and they might see upon finely-divided coal as being carbon in a rough pyrophoric condition. After referring to the other principal constituents of air, nitrogen and carbonic acid, he concluded by saying in that, his first, lecture his object had been to lay before them such an array of facts and theories as should enable them more profitably to occupy themselves of the truths which they would have to study in the two lectures which were to follow.

Mr. LUCAS asked if coal dust, when compressed in a gallery of a mine by the atmosphere, would explode?——Dr. HILL thought not. He thought the way in which coal ignited in a mine was the same as ignition in a hayrick.——In reply to Mr. Homer, Dr. HILL said he always thought from his observation that combustion did not take place more frequently where pyrites were present than where they were absent. He believed it to be a process of oxidisation.——Mr. WRAGGE said they found a difference in coal. Some had a tendency to spontaneous combustion, while in other cases there was comparative safety. It must be a difference of the composition of the coal.——Dr. HILL: Are you aware that the most sulphurous coal is the most combustible?——Mr. WRAGGE: That is so.——Dr. HILL said he was told it was not so, and was inclined to think the difference of coal presented in power of entering into spontaneous combustion depended on physical conditions. Some was dense, some porous; no doubt porosity of surface would influence combustion more than any other condition, but it must depend upon a variety of causes. The question was a complicated one.——Mr. HOMER was of opinion that coal lying with pyrites was more liable to fire than coal not so mixed. He had also found that where an old working had been let into the air was slack or warm for a time, then a current of air caused a fire or might not have taken place without that current of air pressing through.——Dr. HILL said they might have insufficient air, or there might be sufficient air to prevent combustion. It was well known that combustion took place sometimes when there was no substance at all; besides which he had known it to take place in fire charcoal. In a house in France even a beam of wood, which was not on fire, lighted spontaneously. He looked upon pyrophorus as being the explanation of this.——Mr. HOMER said he knew one seam in the district where thousands of tons of slack had been left to waste. In others they were obliged to draw up the slack to secure the safe working of the mine.——Dr. HILL: Is that below or above the average of sulphur.——Mr. HOMER: I believe below the average of sulphur.——After a short pause Mr. Homer begged to move a vote of thanks to Dr. Hill for his able and interesting lecture. He should be glad to hear Dr. Hill again. A thorough ventilation of the subject would tend to the prevention of accidents in mines.——Mr. WRAGGE seconded the motion, which was carried in a hearty manner.——Dr. HILL, in acknowledging the vote, said the next two lectures would be more practical and more to the point, and therefore, he trusted, more interesting.——The CHAIRMAN urged all who could attend the next lecture to do so, observing that the subject of fire-damp was one in which they were all deeply interested.——On the motion of Mr. LUCAS, seconded by Mr. STRICK, a vote of thanks was cordially passed to the Chairman, and the proceedings were brought to a close.

THE NEW POWER JUMPER.



Although only introduced within the last few weeks, having been shown for the first time in February of the present year, and described and illustrated in the *Mining Journal* of Feb. 8, no less than 14 of the "power jumpers" are already in active use, and orders for half-a-dozen others are in course of execution, the Great North of Scotland Granite Company, Aberdeen; Earl Vane, Seaham Harbour; Messrs. J. Tylor and Sons, of Maes-Melin, Neath; the Buxton Lime Company, Derbyshire; the Camps Lime Works, Midcalder; the Shire-Oaks Colliery, the Kirkwood Colliery, and Mr. A. B. Fleming having the jumper daily in operation in this country, whilst the Société des Carrières de Quenast of Brussels has one, and Mr. Eyquem, of Paris, has four constantly at work. The testimonials received as to its working are highly satisfactory. For example, Mr. Hubbersty, of the Buxton Works, got 18 ft. 10 in. drilled in the day of five hours, and expresses his perfect satisfaction with its capabilities. Mr. Torrance, of the Camps Works, believes the longer it works the better it turns, and considers it "really a splendid machine;" the opinions of Mr. W. E. Walker, of Lord Leconfield's mines, Whitehaven, of Mr. John Main, and of Mr. J. S. Simpson, C.E., are equally encouraging.

The machine is also ordered by Messrs. Brand and Addie, of Glasgow; F. H. Edwards, of Newcastle-on-Tyne; J. Mitchell, of Edmund's Main Colliery, near Barnsley; by the Talysarn Slate Company of North Wales, by the Barrow Hematite Steel Company (two jumpers), and by the Bessbrook Spinning Company of Armagh, Ireland; the latter order is regarded as of much interest in showing the great advantage of cheapness in machines of this class. The company referred to, as the name indicates, are unconnected with mining enterprise, but engaged in constructing a short canal to their works, in order to secure the advantage of cheap water carriage, and estimate that from the small first cost involved it will pay them to adopt the "power jumper," although they have but one piece of work to perform. With regard to the general applicability of the machine, Captain William Wasley, of Mold, writes that he has had great experience of rock-drilling in many mines in Cornwall, Carnarvonshire, Denbighshire, Flintshire, and other places, and "considers the 'power jumper' well adapted for drilling holes in any kind of rock in any of the above four counties, and he congratulates Messrs. C. Ha[ll] Co. on having succeeded in getting the agency of such a v[alu]able machine. It has only to be a little more known to secure it a very extensive sale wherever any rock-drilling has to be done, and he considers it everything that can be desired for the purpose."

As to the progress made by the "power jumper," it is claimed that it will bore the hardest rocks, such as granite, quartz, [hard] ironstone, whinstone, chert, limestone, &c. It progresses at the rate of 2 in. to 1 ft. per minute, according to the nature of the rock. The larger machines bore holes 3½ in. in diameter, and will progress at about double the rate of the smaller drill. The "power jumper" can be used at any angle and in any direction, and will bore and clear itself to any depth up to 20 ft., and it is estimated that the saving obtained by its use, on the drilling alone, is about one-half as compared with hand labour both in time and cost; that the expense in drills is reduced to about one-tenth of what it is when sledge and hammer are used (the average depth a 20-in. drill will bore in hard rock, like Aberdeen granite, without sharpening is from 15 to 20 ft.), and an ordinary blacksmith can dress the tools that the output being increased fourfold the general expenses, such as pumping, ventilation, interest on capital, maintenance of [plant], &c., are reduced per ton of material extracted in a like [ratio]. Upon the first introduction of rock-drilling machinery consi[derable] difficulty was experienced with regard to the motive power, compressors being generally somewhat costly, and the use of [pipes], &c., in close ends being attended with much inconvenience [and] any circumstances, and being in many cases quite inad[missible]. The difficulty, however, has been gradually overcome, and the [perfect]ing of the air-compressor, shown in the above diagram (which presents a machine for driving two drills), has given every [satisfac]tion. The power jumper in use at Messrs. J. Tylor and Sons, the four employed by Mr. Eyquem, above mentioned, are all [worked] by this compressor, and from the results obtained with it will, believed, quickly come into general use.

NEW METALLIC PISTON.—At the Manchester Scientific and Mechanical Society a discussion took place on the new patent Steam Expanding Metallic Piston, of which models were exhibited by the inventor, Mr. O. Ros[e]. steam expanding piston was described as an improvement upon the modern metallic packing piston, now in common use. In the new piston all springs are dispensed with, and the metallic packing segments are pressed against the cylinder surface by the action of the steam. The necessary small excess of pressure which is required between two surfaces to make a tight joint is here obtained by making the area of the surface on which the steam acts a little larger than that which receives the pressure on the cylinder surface. Thus, if the steam acts with a certain pressure, say on a square inch of the inner surface of the packing segment, it is transmitted on a smaller surface at the outer surface, by which the pressure is intensified, or the pressure per square inch is greater. This difference of intensity is the [essential] feature of the invention, and just sufficient to make what is termed the joint. The advantage of the piston lies in the diminished friction, which means, of course, a saving of power or reduced consumption of fuel. The friction at all points of the [piston] is proportional to the impelling power of the steam, whereas in the spring [pattern] piston it is uniform throughout the stroke, and equal to the greatest pressure of steam at the commencement of the stroke.

THE MINING JOURNAL.—Now ready, strongly and neatly bound, price 1*l.* 12*s.* 6*d.*, VOLUME XLII. FOR THE YEAR 1872. To be had through any newsagent or bookseller, or direct from the *Mining Journal* Office, 26, Fleet-street, London.

Meetings of Public Companies.

THE BELLAVISTA SILVER MINING COMPANY.

general meeting of shareholders was held at the offices, Austin-
on Thursday,—Mr. G. CLERIHEW in the chair.
JOHN HARRIS (managing director) read the notice convening
eeting.
report of the directors stated that much preparatory work was
ished during the early part of last year by the acquisition in England of the
very for the development and working of the mines, consisting of steam-
boilers, and pipes for draining the Candelaria Mine; also a turbine with its
pipes, wheels, and shafting, for utilising a water-fall on the property, and
for working the blowing-fans of the furnaces, also for driving a circular-
o wrought-iron rails for a light tramway through the adit level, implements,
tools, &c., all of which, with a supply of fire-bricks for the furnaces, arrived
Callao in July last—since which time the greater part has been conveyed
acienda or farm at Bellavista. The unsettled state of public affairs that
in Peru in August and September last, especially at Lima and Callao, pre-
also for a time over the country generally, and that circumstance prevented
nuance of the regular dispatch with safety of the convoys of stores and ma-
from the coast to the mines. Operations were, however, renewed after an
of about two months, and Col. Harris would then have gone to Bellavista
the necessity of his remaining at Callao to supervise the dispatch of the
antities of stores, &c., wanted at the mines. He has expressed himself as
essed with all that was brought under his observation at the mines as tend
promote the ultimate success of the undertaking. He states that the personal
felt by himself in its progress will determine him to make another visit to
as at the beginning of May next. In the meantime he has sent a very
ary report of his visit and inspection of the property, with others from the
ndent of the mines and from the smelter.
report of Colonel Harris announces the discovery of a deep
existing at the base of the Candelaria Mine, which, when driven through,
ble the company to dispense with the use of all steam machinery for pump-
great an elevation above the level of the sea. This deep adit will ulti-
very greatly enhance the value of the property, and facilitate the develop-
depth of one of the richest mines in Peru, and also suffice for the working
st economically. He has given orders to continue the driving of this level
speed, and for the pipes that were sent for the steam pumps, now to be
r conveying air to the breast of the working of this adit. In its progress to-
the mine he should not be surprised to find some valuable lodes have been
ough, as there are several indications at surface of such existing in that di-
Therefore this old mine with its great and extensive workings will at
he unwatered, a new mine opened up at a greater depth, and the ends of the
tings recovered, which are now flooded, and are known to be very rich in
re. The ore now being raised from the new Candelaria Mine is in fact ob-
from the same lode as that of the old mine, and above water level, which
about 10 feet wide, and its quality is very superior. He has taken possession
ge extent of pasturage belonging to the mines for the donkeys and llamas
in bringing down ore from the mine, and he remained at the Candelaria
days that he might make a thorough examination of it. While there he
a mud hut, and had only llama dung for fuel, which was an arduous duty
Europeans; nevertheless, he felt so intensely interested in the future of the old
reat mine, as well as its present worth to the company, that it became for him
of pleasure rather than pain to spend all that time there. What with the
e of small-pox prevailing on the farm, revolution, the bad state of the roads,
mode of transit of stores, &c., on mules' backs for a distance, to and fro,
miles, and other difficulties attendant on the formation of a new undertaking,
are circumstance that will lead all considerate persons to admit that no
s been lost in the performance of the work already accomplished at the mines,
both economy and persevering industry have been judiciously exercised.
report of Mr. Christian Van Nes, the superintendent, stated
work simultaneously the many mines existing on the property of the com-
would not only require an immense capital, but also extensive means for con-
ore away from each of the mines, which would employ a great number of
for that alone. Therefore he has and shall continue to devote his time and
for some time to come only to such of the mines as he considers most ad
ons for the production of ore for the furnaces, and at an easy distance, that
may be worked at the lowest cost in order to economise the working capital.
d Candelaria Mine has been worked for centuries on a lode of great width,
s produced an immense amount of riches. However, for some years past,
re Indians have without let or hindrance been robbing this mine of much
e ore, and in doing this they have in some parts of the mine destroyed the
s to the levels, thereby occasioning much devastation. In consequence of
mage he considered it advisable to avoid incurring heavy expenses in the
ne previous to the arrival of Col. Harris, director), that they might then
together on the best mode of proceeding thereat. The lode in New Cande-
ries from 8 to 10 ft. in width; it yields all saving work for silver, and in it
in silver as to yield 180 ozs. to the ton, and any quantity can be raised from
ne, for it can be worked at 20 different places at once, but operations can only
ried on there during five months of the year, as it is 17,000 ft. above sea level.
ilver mine called the Casualidad, near to the above, can also be worked in se-
different places if required, but having in the before-mentioned mines such
ndance of silver and lead ores, as much to exceed for a time all that they
ssibly reduce.—Coal Mine: This is a most valuable appendage to the pro-
, at which they have men now employed in cutting coals and driving a level
e purpose of raising as much of it as they may require. The seam is 6 feet
, and they have already driven into it for a distance of 20 yards, in doing
they found the further they advanced in the mine the firmer and better the
became. The men can get 1 ton of coal each per day, and the cost of its con-
ce to the smelting-works by donkeys is 1s. per cargo of 2 cwts., or 10s. per
but with their own donkeys 7s. 6d. per ton only. There is an abundance of
er on the property, free of cost except that of felling it, for prop wood, and
good fire-clay for the furnaces. As Mr. Dunstan will require a large quantity
coal for smelting they are most favourably situated for such a supply of that
e, therefore they have have contracted for 1000 donkey loads to be delivered at
works at a cost not exceeding 21s. per ton. The strictest economy in all the de-
ments is being practised, and all the persons employed are exerting themselves
vance the interests of the company.
e report of Mr. W. C. Dunstan, the smelter, stated that with
ars experience as a smelter he has no hesitation in saying the silver, lead, add
ores brought down from the mines will smelt well together, and that he has
seen ores of better quality than those they are obtaining here.
e CHAIRMAN said the directors were very happy to have the
rtunity of meeting the shareholders; they had intended to have
vened a meeting some time ago, but upon consideration it was
ght it would be much better for all parties that before doing so
rts should be received from the mine, so that they could dis-
ll matters with a full knowledge of the facts. He had no
bt that those reports, which had been for some time in the hands
e shareholders, would be regarded as highly satisfactory, as
y corroborated everything stated in the prospectus as to the value
e mines, and in some respects they were even better. They all
w full well the history of the company—every detail had been
acted in the most economical manner; there was no promotion-
ey, and the preliminary expenses did not exceed 135*l.*, and
ly could think, considering the character of the reports as to
value of the different mines, that the company had paid too high
ice for the property, but that the company had made a very good
gain, and that the shareholders had good reason to congratulate
mselves upon the extremely limited amount of expenditure in-
red, and also the terms upon which the property was acquired.
to the value of the ores from the different mines, the percentage
silver in some is not quite so good as represented in the prospectus,
in others it is considerably greater. As a whole, the know-
ge they now possess is more favourable than that which they pre-
usly had. As to the Candelaria Mine, it was stated in the pro-
ctus to contain a lode 4 ft. wide, but it is now stated to be from
10 ft. wide, and the whole is saving work for smelting. There
two other features which deserve attention, as increasing the
ue of the mine—an ancient adit has been discovered which must
e been driven centuries since, the continuance of which will
ble them to work the mine at a smaller expense than was com-
ted at the formation of the company, as pumping machinery will
be required. They will, moreover, obtain any quantity of coal
uired from their own property at a cost of 10s. per ton or less, and
o charcoal—indeed, everything in connection with the smelting
erations is exceedingly favourable. It is very fortunate they had
ceeded in sinking a new shaft above the water level in Candelaira,
abling them to bring up silver during the unwatering of other
rts of the mine. The Nino Perdido Mine is turning out very much
tter than expected; it is a silver-lead mine, in respect of which
is stated that it can be made to yield any quantity, its silver
ntents being 180 ozs. per ton of ore; there can be no doubt of its
lue, yet that is not the principal mine possessed by the company.
e Potosi Mine also contains very rich silver-lead ore, and it has
e immense advantage of ample water-power, by means of which
mping and hoisting can be carried on without steam. There is
ally no matter of regret, except that the directors would have wished to be in a position to state that silver is now arriving in this country, but that is not the case, on account of the political state of the country and the one or two circumstances referred to in the report, but it will not be long before remittances will be received. The first furnace ought to be about ready now. As nothing has been said about labour it is concluded that it is plentiful and cheap, and if it can be obtained at anything like the rate that has hitherto prevailed in Peru they will be infinitely better off than those who carry on mining enterprises in other countries. All he, in conclusion, could say was that the directors would continue to do their utmost to ensure the prosperity of the enterprise, and to conduct every detail with the greatest economy compatible with efficiency. He then moved that the reports and balance-sheet be received and adopted.——Mr. HALL seconded the proposition.

Mr. SEBOCOLD enquired the presumed distance they would have to drive the newly-discovered adit before getting under the old workings?——The CHAIRMAN said the old workings were 500 ft. from the mouth, and about 150 ft. had been cleared. It was very much shorter than the old adit.

Mr. HARRIS mentioned that the directors contemplated sending out a power-jumper, by which the driving of the tunnel will be greatly facilitated, and in its course it is likely other lodes may be met with.

The CHAIRMAN said that the celebrated Cerro de Pasco Mines, which had been so extraordinarily rich for many years, are 40 miles higher up, and their communications pass the Bellavista property, so that the interests are identical in promoting the completion of the railway up to the district, a distance of about 50 miles. It is impossible to say what number of mules will be required until the railway shall have been completed, because any quantity of mineral can be raised.

A SHAREHOLDER asked, as there now seems to be no necessity for the steam-engine, what portion of the machinery will be required?

The CHAIRMAN said it will certainly be required for another mine.

Mr. HARRIS said it was proposed to reduce the ore to a rich regulus, the lead being used as a flux, but it has not yet been determined what will be done with the copper.

The CHAIRMAN said that as soon as the railway is completed the lead will become of an enormous commercial value. As to capital, there is not the slightest prospect of wanting money, as any amount required can be easily obtained.

Mr. HALL said that a great deal of the machinery had been got up to the mines, as no single portion of it exceeded 300 lbs. in weight. The turbine was expected to be as heavy as any portion of it, and that, it is expected, is now at work.

Mr. SERVEDD said that the expenditure for salaries was very moderate in amount, and he was sure it was the interest of the company to be generous to such men, and suggested that they should have some participation in the profits.

The CHAIRMAN also considered it a material point that the officers in charge of a mine in a foreign country should have not only a salary but also a commission upon the profits realised.

Mr. HARRIS observed that the vendor would not receive the remainder of the purchase-money until the mine pays a dividend.

The CHAIRMAN said it is proposed to erect three furnaces in the first instance, but they can at any time increase the number. As he had already mentioned, it is expected the first is now about being completed. The Candaleira Mine can be worked throughout the year, but the others, being at a greater elevation, can be worked only five months of the year. The two proposed to be worked at once are inferior to the others, but the reason is because they are close to the principal one—the Candaleira—the difference in elevation between the mines and the hacienda being about 2000 ft. As the value of silver is very great it will not take long to pay a good dividend, as the capital is so small. The shareholders will be informed as soon as the first consignment of silver is to hand, and also its percentage.

The motion adopting the reports and balance-sheet was then put and carried unanimously. Mr. Thornton was re-elected auditor.

Upon the proposition of Major MARTIN, seconded by Mr. DENT, the retiring directors were re-elected.

A resolution was passed that half-yearly general meetings be held.

The sum of 200*l.* was voted to the directors for their remuneration since the time of the incorporation of the company, to be paid out of the first profits.

Mr. HALL, a director, in acknowledging a vote of thanks to the board for the satisfactory manner in which they had conducted the company's affairs, stated that he believed nothing is required to ensure success but a steady perseverance, as no doubt can exist as to the productive character of the mines. They know the means are available for the extraction of ore as well as for the transmission of it to the coast, therefore it is only a question of patience and perseverance.

A vote of thanks to the Chairman closed the proceedings.

THE WEDGWOOD COAL AND IRON COMPANY.

The statutory meeting of shareholders was held at the offices of the company, Gresham House, Old Broad-street, on Tuesday—

Lieut.-Col. P. R. INNES (Chairman of the company) in the chair.

The SECRETARY having read the notice convening the meeting,

The MANAGING DIRECTOR presented his first report, and took occasion to congratulate the shareholders on the increased and so far steadily maintained prices of both coal and iron, and that no contracts except for a mere nominal weight of ironstone were in existence when the company took possession of the property two months ago. During that time the development of the works has been very satisfactory, and notwithstanding the great difficulties attending the labour question a steadily increasing number of hands have been procured. In consequence of the difficulty of obtaining sufficient rolling-stock to meet the requirements of the company, a considerable quantity of coal and iron has been stacked. This defect, however, will be soon remedied, when the extension of the branch railway system in various parts of the works is completed. Within the last six weeks a branch line from Wedgwood to Lane Ends has been commenced, and is now within a few days of completion. This line, 600 yards in length, is being laid as a permanent way, and will greatly expedite the removal of the large stock now accumulating at Lane Ends. The main branch from the North Staffordshire Biddulph Valley Railway is also completed to the extent of 100 yards up to Wedgwood No. 2 pit, wide enough for a double set of rails 4 ft. 8½ in. gauge. Two additional cuttings and branches about 100 yards in length each have also been made, and are now in working order for the delivery of ironstone at Wedgwood from the rucks direct into wagons. Since the company entered into possession, on February 17 last, contracts have been arranged with some of the best and safest firms in the trade for upwards of 6000 tons of ironstone, or calcined mine, at prices ranging from 21s. to 24s. per ton, into trucks at the works. With a view to secure the present high rates 10,000 tons have been offered to different consumers, a step which has been justified by the present stock, and the weekly increasing output; and although a much larger quantity could be put upon the market it is considered prudent to wait and see what change may take place in prices and value of labour during the next six months. The quantity of ore imported into this country is materially decreasing, and buyers who have been in the habit of obtaining large quantities of hematite ore from Spanish and other ports, through the present unsettled condition of the Peninsula, and disturbed state of railway communication there, and also from the increased cost of obtaining it from other ports, owing to the ruling rates of freight, consequent upon the enhanced price of fuel, wages, and of, indeed, almost everything, have been restricted and shortened in their supplies, and the natural result will almost assuredly be the maintenance of the present high quotations for English hematite ores and stratified ironstones. Although coal has not risen so much in proportion as ironstone, yet there has been an average increase of, perhaps, 30 per cent. The new pit, No. 2 Wedgwood, has been completed since the company took possession to the depth of 80 yards, and ironstone is now being rucked and coal delivered from it into wagons. A new pit has also been commenced to the "deep," 50 yards from the No. 2, which is now down 12 yards, 8 ft. 6 in. diameter, and bricked. It is anticipated that this will be completed to the Ruehurst coal, a depth of 35 yards, next month, and will enable the company to win a large quantity of this valuable coal, which is 1 yard thick. A small pit and footrail have also been sunk and driven on the crop of the Twist coal, close to the branch line to Lane Ends, from which a considerable quantity of coal has been got, and from which, with a small engine to draw from the "deep," a further considerable supply may be expected. It is very important to note that no water or gas have been wet with in all the workings on the estate, and there is nothing at present to cause the slightest doubt that a largely increased output, both of coal and ironstone, to the extent of from 400 to 500 tons per day, may be made in the course of a few months.

The report was unanimously adopted, and the thanks of the meeting were given to the managing director for his able report and his efficient management of the works. The directors and auditors were re-elected, and the proceedings closed with a cordial vote of thanks to the Chairman for his earnest endeavours on behalf of, and his able and courteous conduct as Chairman of, the company.

THE SUCCESS, RUSHY CLIFF, AND NANCY CONSOLS LEAD MINING COMPANY.

The statutory meeting of shareholders was held in the Athanæum Rooms, Derby, on Tuesday, April 15,

Mr. H. C. SIMPSON in the chair.

The SECRETARY read the notice convening the meeting.

The CHAIRMAN having congratulated the shareholders on the prospects of the company, explained that that was a statutory meeting, called in compliance with the Act of Parliament. He was, however, very glad to see them, and thought it a good and very proper thing for them to meet together, that they might ascertain what had been done, and see that the directors were carrying out the objects of the company, so as to promote the interests of the shareholders. Up to that date they had not been doing much at the mines, owing chiefly to their having been disappointed in obtaining a proper man to act as captain of the mines. They had at length been fortunate in securing the services of Capt. Henry Francis, and they should, therefore, be able to proceed with the workings. On Saturday they had driven the two adits a distance of about 40 yards, and had found that the driving was comparatively easy. Although it was a slow process, the adit must be driven in order to reach the virgin ground beyond. Afterwards winzes could be sunk and levels driven therefrom to gain greater depth. He (the Chairman) went on to explain the condition and formation of the surface in the locality, and adverted to several peculiarly favourable features. He concluded his remarks by observing that the driving of the adit would occupy some considerable time, which must be allowed; but now Capt. Francis had come they should be expecting to get on well, and were trying to carry on the workings with energy and economy.

The SECRETARY then read Capt. Henry Francis's report, as follows:—

These mines are in the same strata as the celebrated Ecton and Magpie Mines, which are the magnesian limestone covered by the fossiliferous limestone, and this in turn by the loadstone. At the Nancy Mine there is a large, wide, and fine-looking lode, on which an adit level has recently been started, and driven about 40 yards, the lode throughout this drivage producing fine stones of lead ore, together with all the other essentials necessary in the matrix for rich deposits of lead ore being found at a deeper point. Eastward from the adit there is an extensive range of old workings, and on either side there are numerous caunter and cross veins or lodes, all running into and forming junctions with the main vein, on which the adit is being driven. At such junctions large bodies of ore are usually found. At Rushy Cliff most extensive surface scratchings have been made on land covering an area of several acres. The adit being driven here will fully prove this portion of the property, and the driving of this adit should be pushed on with the utmost dispatch, as in addition to proving the Rushy Cliff and Success lodes, it will intersect any other lodes from Nancy. This adit has been driven about 38 yards, and will intersect the first lode in about 5 yards more. At the Success Mine most extensive workings have been carried on at some distant date, and from the extent of the stopes I should say with great success. The operations here have been suspended until the Rushy Cliff adit has been driven into the lode, a point of very great interest, as the adit will meet with the lode in the lower or magnesian limestone. In conclusion, I beg to observe that all this fine mineral property remains almost wholly undeveloped, and I have the utmost confidence that a vigorous prosecution of the trials recommended will be attended with successful and highly gratifying results.—H. FRANCIS.

The CHAIRMAN said if any shareholder had any questions to ask he should be very happy to answer them, and so also would Capt. Francis.

Capt. FRANCIS said he could most heartily congratulate the shareholders, and was most happy to tell them that the property was one of the very best that had come under his notice for many years, and at no distant period he had no doubt the results would be found to be even more important than they then appeared, of that he felt quite certain.

No question of importance being asked, the CHAIRMAN said he supposed all the shareholders were satisfied. (Hear, hear.) They would find Capt. Francis was well qualified to carry out the works properly.

A SHAREHOLDER said there was no doubt of it, and he should like to go over and see, as also would several of the shareholders, how things were going on. The question of the most convenient days for visiting the mines was broached and discussed, and Monday in each week fixed as a visiting day.

A vote of thanks to the Chairman, directors, and secretary, in consideration of their earnest and hearty services on behalf of the company, was proposed by Mr. WORSNOP, seconded by Mr. PARKER, and heartily adopted.

The CHAIRMAN acknowledged the compliment on behalf of the directors, secretary, and himself, observing they were much obliged by the vote and by the confidence it indicated, and as long as that confidence was extended to them they would do their utmost to deserve it. ——

THE WICKLOW COPPER MINE COMPANY.

The half-yearly meeting will be held at the company's offices, Dublin, on April 28, when the following report will be submitted:—

The report states that from the report from Mr. Hodge, our manager at Ballymurtagh, that both the north and south mines, and the iron ore lodes, present most favourable appearances. While still suffering from a scarcity of skilled labour, yet good progress has been made in the continued opening up of the different levels, and in addition to the fact that good sulphur ore is being now obtained from the north mine, there is also every prospect of there being some rich ore at the 112. The prospects are most cheering in the south mine—from it, just at the close of the half-year, a parcel of coppery ore was sent to Liverpool, for which a good price was obtained. This is the first cargo for some years of copper ore sent from the Time House shaft, from which there is every reason to expect there will be a fair average quantity of this ore raised. As to the iron lodes, your directors feel justified in stating that the deposits are much in excess of their original anticipations, there being a supply for many years to come of most excellent ore at present exposed to view. Mr. Hodge has contrived a much better series of arrangements for the make of precipitate copper, as will be seen, the quantity made within the half-year is more than doubled, and there is reason to hope that this quantity will even still be increased. The raisings of the previous half-years being based on estimates, it is not easy to compare them with the absolute raisings as given for this half-year in Mr. Hodge's report; but it is believed that the item of pyrites is nearly 1000 tons in excess of the corresponding half-year in 1872. As to the amount of ore shipped during the half-year, it will not be forgotten that this—the winter half-year, is by far the worst both for sending ores from the mine and for putting them on board. This will account for the net profit being somewhat less than in the previous half-year. The Dublin, Wicklow, and Wexford Railway Company have most obligingly made some alterations at the mineral platform at Ovoca, which will enable us to forward during the current half-year much larger quantities of ore to Arklow. The demand for pyrites and iron ore is steady, and prices for both are improved.

CHEMICAL WORKS.—The late period in the half-year at which the new capital was obtained deprived the works of any benefit to be derived therefrom. This, combined with the very high price for coal, and in consequence thereof, a great dulness in the chemical trade, will in some measure account for the loss in carrying on these works during the half-year. But the directors look forward with confidence to these works when completed being a most important portion of the property.

NEW CAPITAL.—Of the 4122 new shares authorised to be issued on Jan. 25, 1873, 3481 have been applied for by, and allotted to, the shareholders. The remainder—641—are retained by the directors in trust for the company. The directors having had several enquiries from shareholders as to the limited liability of the company, take this opportunity of stating that they have the opinion of eminent counsel to the effect—"That the shareholders in the Wicklow Copper Mine Company, the shares in which are fully paid up, could not, under any circumstances, be rendered liable for the debts of the company," the liability of the shareholders being limited by the Companies Act of Incorporation.

The directors regret having to announce the resignation of Mr. Octavius O'Brien. Elected an auditor of this company in 1863, he joined the board on the death of Mr. M'Dowell in 1865, and on the resignation of Mr. John Barton in 1871, he was elected Chairman. He was at all times most active in furthering the interests of this company, in the management of whose affairs he sacrificed a great deal of most valuable time. At the last half-yearly meeting Mr. A. Andrews was elected to fill the place on the board vacant by death of Mr. Barnes, and Mr. W. Archer was elected auditor.

Mr. John Hodge, the manager, says—"The mine, with the shafts, levels, tram-roads, and steam-engines, is all in fair working order."

SOUTH PLYNLIMMON.—An extraordinary meeting was held on Wednesday (Mr. W. S. Sutton in the chair), when it was resolved that the special report of Messrs. Richard and James Nancarrow should be issued among the shareholders.

WEST WHEAL LUCY.—At the general meeting, on Thursday (Lieut.-Col. Stuart in the chair), the accounts for the four months ending March, showing a balance against the mine of 270*l.* 9s. 10d., were examined and passed, and a call of 3s. per share made. The agent reports the discovery of a fine tin lode in the western workings, which promises to be of importance, some stones broken from it yielding 20 per cent. of tin.

FURZE HILL.—The fifth ordinary meeting of shareholders was held on the mine, near Horrabridge, on Thursday, Mr. E. Betteley, Chairman of directors, presiding. The accounts, with reports from the directors and agent, were received and adopted. Dr. Gillow was re-elected a director, and Mr. T. W. Greenfield was re-elected the auditor of the company. The directors reported that a water-wheel, 35 feet in diameter by 3 feet breast, has been erected, and a double-acting drawing machine has been attached to it, which at present is capable of drawing all the stuff from the mine. When this is in complete working order it will enable the 12 heads of stamps, connected to the 35 feet wheel, to be in constant operation. One of Messrs. Harveys' pneumatic stamps has also been erected, and is being driven by the 25-feet wheel. Judging from trials already made, it is equal in stamping-power to nine heads of the old stamps. Two parcels of black tin, weighing nearly 11 tons, have been sold, realising 900*l.* The directors hope that with the present additional stamping and drawing power the future returns will be sufficiently large to enable them to meet the current costs, and properly develope the resources of the mine. The agent's report, which was of a very satisfactory nature, detailed all the operations now in progress, and the work accomplished since the last meeting.

CARN CAMBORNE.—At the meeting, on April 9 (Mr. A. H. Cockett in the chair), the accounts for three months to date showed a debit balance of 984*l.* 13s. 11d., and a balance of liabilities over assets of 489*l.* 9s. 4d. A call of 2s. per share was made. Capts. Rowe and Penberthy reported upon the various points of operation; they calculate it will occupy some four or five weeks to get the shaft the required depth for a 95 fm. level, after which the north part of the lode will be taken down, and levels extended on its course both east and west. Work upon the productive parts of the lode at the different levels, to obtain as near as possible sufficient returns to meet the current expenditure of the mine, which they calculate will be about 400*l.* per month.

MARKE VALLEY.—At the annual general meeting, on April 9 (Mr. B. Warburton in the chair), the accounts for the three months to date showed a credit balance of 836*l.* 3s. 10d., and a balance of assets over liabilities of 622*l.* 12s. 11d. The cost for the quarter amounted to 469*l.* 12s. 10d., and the sales to 428*l.* 19s. 11d., leaving a loss of 622*l.* 12s. 11d. Capts. J. Seccombe, J. Stenlake, and W. Hosking reported upon the various points of operation. They remark that although the accounts for the past three months show an apparent loss of 600*l.*, the deficiency is really caused by the additional outlay upon the shafts, explorations for tin, and surface erections. Thanks were voted to Mr. Seccombe for his exertions in the management of the mine.

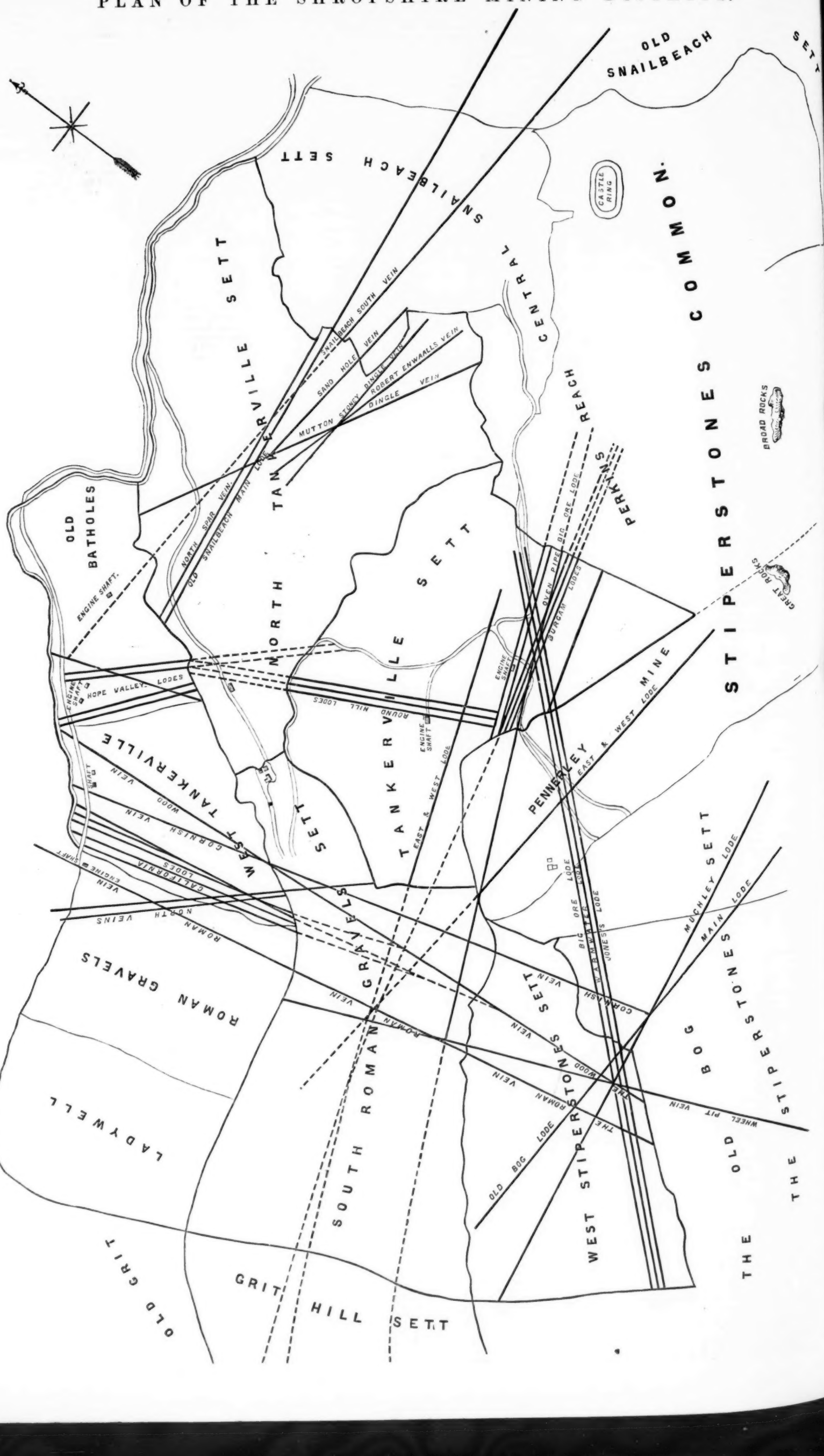
EAST GUNNISLAKE AND SOUTH BEDFORD.—At the meeting, on Tuesday (Mr. C. F. Carne in the chair), the accounts for the three months to date showed a credit balance of 55*l.* 18s. 6d., and an estimated balance of liabilities over assets of 332*l.* 4s. A call of 2s. 6d. per share was made. Capt. James Bray reported that their present prospects were more encouraging than he had ever seen them since they commenced operations on the Impham lode.

YUDANAMUTANA.—An extraordinary general meeting was held on Wednesday (Mr. Hills in the chair), when resolutions were passed for the dissolution of the present company, with a view to its re-construction upon the terms set forth in the circular, which have already been referred to in the Journal. Mr. Casswell and Mr. Lock were appointed joint liquidators.

[For remainder of Meetings see to-day's Journal.]

BLENCOWE CONSOLS TIN MINE.—On Wednesday, April 2, the new stamping-engine just erected on the above mine was successfully started. The ceremony was performed most gracefully by Mrs. Fytche, wife of General A. Fytche, C.S.I., after whom the engine was called; and the manner in which the engine at once commenced its duties reflects the greatest credit on the engineers, Messrs. West and Son, of St. Austell and Blazey Foundries. The engine is a double acting one, with a 36-inch cylinder; and, although only 28 heads of stamps were set to work, it is calculated to lift 120 heads, which will eventually be erected. After the working of the engine, and the Borlase and other buddles had been thoroughly examined, the party adjourned to the account-house of the company to partake of a substantial *déjeuner*, which had been provided by Mrs. Thomas, of the Railway Hotel, Grampound Road. Numerous healths were drunk and toasts proposed, the directors and shareholders present expressing the greatest gratification at the manner in which not only the stamping engine, but the pumping engine and all the other machinery, had been erected. Amongst others, the health of Mr. M. E. Jobling (the managing director of the company), coupled with that of Mrs. M. E. Jobling, who was present, was most enthusiastically responded to. General Fytche, in proposing the same, stated that it gave him great satisfaction to see the way in which the works had been carried out, and he considered Mr. Jobling and his agents worthy of the highest praise for the same, and expressed his entire faith in the future success and prosperity of the mine. The health of Mr. N. G. Lambert, M.P. (the Chairman of the company), who was unavoidably absent, General Fytche and Mrs. Fytche, Mr. C. E. Crighton, Capt. F. Retallack, of Chytane, and many others, were cordially drunk. On Saturday, April 5, an ample repast was provided by Messrs. Olner and Thomas, at St. Stephens, for all the miners and workmen connected with the mine.

PLAN OF THE SHROPSHIRE MINING DISTRICT.



s on the Shropshire and Van Mining Districts.

BY J. Y. WATSON, ESQ., F.G.S.

Lead Mining District of Shropshire is one of the oldest in the om, and was worked by the Romans, as the name of one of its pal veins implies. I have before me a printed document in which ted that there is preserved in the neighbourhood at the pre- y a venerable "pig" of lead, stamped with the date and reign ian VIII.! But who was Adrian VIII.? There was only one n Emperor and six Popes called after that name. Adrian IV. n Englishman, one Nicholas Brakspeare, of Abbots Langley. s the only Englishman ever made Pope, and the most bump- f all Popes. He snubbed Emperors. He made Frederick I. foot, and hold his stirrup while he rode. He did many other t things also, till he died suddenly in 1159, just as he was o excommunicate the Emperor. But history does not tell all this mighty bumptiousness was owing to any sudden f fortune in a mine. Besides, he lived 700 years after the had ceased to govern England. The last Adrian Pope died but there was the Emperor Adrian, who resided in England . He made the Roman wall of Adrian and Severus, which d from the Tyne to Solway Firth, was 80 miles long, 12 feet 8 feet in thickness. This, with its watch towers, was A.D. 121. And this Adrian, who was a very active gentle- ded, ruled the northern counties, and when he returned to e was called the "Restorer of Britain," and had these words d on his coins. It is possible, therefore, that this was the Emperor who also stamped upon the venerable pig of lead n and symbol of "Adrian, his mark!" And if so, it must years old, and I should like to know where it is, and how been so long preserved.

hundred and twenty years ago, according to Mr. A. Waters, se skill, forethought, and perseverance the present success of strict is almost entirely owing, most of the mines then in ion were taken by the Messrs. Lawrence, who worked them ried success. They worked the old Snailbeach, and aban- it; but the present company, which is a private one, have mething like 300,000*l.* by it, as I understand, and are still very large returns and profits, with the mine 300 fms. deep. e Lawrences also worked most of the country around, and n adit, or boat level, for three miles to develope the country n Old Snailbeach and Burgam, Oven Pipe, Bog, Pennerley, ers. Good discoveries and large returns are said to have ade by each of these mines, but lacking the capital necessary k them efficiently they were all abandoned.

ow come to the present time. Taking the road from Min- along the Valley of Hope (how charasteristic of mining!) right there is a range of hills upon which there are no mines ver, the stratum being a dark shale, in which ore does not in this district. To the left, and running parallel with each are a series of rich veins, upon which there are several mines being worked, situated as will be seen in the sketch that panies this. These veins run a little south of east from Hope and may be illustrated by a series of straight parallel lines, No. 1, Snailbeach; 2, Old Bat Holes; 3, West Tankerville; an Gravels; 5, Ladywell; 6, the Old Grit. Most of these en worked very extensively for the last 50 or 100 years, but three years mark an era in their history to which my at- has been chiefly directed. At that time the Tankervilles, and ently most of the others, were taken up by London companies, the management of Capt. A. Waters, to whose energy and much of the success of the district, as I have said before, is Capt. Waters, I may add, accompanied me to the mines, we him my best thanks for much valuable information and The sketch accompanying this has also been revised and d by him, and may be taken as substantially correct.

eak of all the geological features of the district would oc- e much of your space, without interesting the general reader, re referring to any of the mines in particular it may be ob- and it is important that everyone adventuring in mines in rict should know and consider the fact, that ore never makes hale, or laminated clay-slate, nor in the greenstone, which is at similar to the elvan of Cornwall. The shales answer to y cross-courses of Cornwall, against which the ores make, in them. In fact, all the rich mines in the district are be- beds or courses of shale, and shale and greenstone, and the pipes and bunches of ore are lying near or upon the shale. And, Waters observes, each group of mines has also its distinctive ts of greenstone, and the most productive lodes are those l to the line of lodes referred to. The veins themselves are ded in rocks of limestone, or carbonate of lime, and this is of e character in all the productive mines which occupy the tween the Hope Valley, referred to, and the mountains of on each side.

KERVILLE.—It was in the early part of 1870 that the "Oven from which very large returns of lead had been made, under erfect and crabbed system of working, was purchased by a n company, and called "Tankerville." The sett is four miles Minsterley Railway station, well situated for carriage of ore aterials, and embraces the veins of Burgam, Pennerley, Round &c. A new shaft has been sunk on the Oven Pipe through the rkings, and at great expense, to the 140, and the lode in the is worth 20 tons of lead ore per fathom. There is also a de in the 74 cross-cut east. The present returns are about s per month, and leave a considerable profit. The ores sold March, 1870, have been 5500 tons, for 73,471*l.* 17s. 8d., and 37,200*l.* en paid in dividends. In addition to this the dressing-floors en laid out, and various buildings erected, in a most substantial ficient manner, reflecting great credit on Mr. Waters. Many nds of pounds have been judiciously spent in this way, and ft also must have cost a large sum of money, and in looking future prospects of the company it should be considered that e things have been paid for out of the returns of the mine, in on to the dividends paid; and as the heavy expenses for &c., will now cease, and the returns ere long probably reach n per month, the shareholders may look forward to a consider- ncrease of profits.

AN GRAVELS was taken up by a London Company about two ago, and in this short time (from February, 1871, to February, has returned 3557¼ tons of lead ore, for 49,001*l.* 9s. 6d., and 19,200*l.* in dividends. In 1871 the price obtained for the lead was 12*l.* 2s. 5d. per ton, in February, 1873, 16*l.* 1s. 1d. per ton. ast sale, in March, brought 16*l.* 18s. 6d. This rise in lead is the at all the mines, and the prospect is that it will go even r, for there is a great demand for lead, owing to the falling off produce in Flintshire and other counties. Roman Gravels is s deep under adit, and the deepest level worth 3 to 5 tons per m. The present sales of lead ore are about 200 tons per month, hen the new dressing-floors are complete, and they are being out like those at Tankerville and on a large scale, the returns e nearly doubled, and the mine may safely be said to be one of chest lead mines in the country, and may in a few months rival an in its returns.

UTH ROMAN GRAVELS.—A glance at the map will show that mine lies between Roman Gravels, Tankerville, and West Tan- ille, and takes most of the rich lodes of the district. Towards Roman, or the rich lode of Roman Gravels, a cross-cut has been n 95 fms., and the water is issuing very fast from the end; ed, it has drained the 40 fm. level in Roman Gravels, and the ence is that the lode cannot be far off. This is a very important t, but the most important, as it appeared to me, is the Shelve- shaft on the rich Wood lode of Round Hill and West Tan- ille. I have mentioned before that lodes in the district invari- make rich under certain well ascertained conditions and cir- tances, and Capt. Waters called my attention to the important here that the shaft, which is on the brow of a steep hill, is sunk between the greenstone and the shale. The greenstone dips the top of the hill at West Tankerville, and the shale is in the valley below. The shaft is sunk in the ore-bearing strata, and the lode, which is 2 ft. wide, is in a beautiful matrix of carbonate of lime, and from 6 to 7 tons of lead have been already raised from it. The shaft at present is only 20 fms. deep, or 11 fms. under adit, and at a depth of about 20 fathoms under adit it is the opinion of Capt. Waters that it may come into a body of ore dipping towards it on the back of the greenstone, and between that and the shale. Here, then, are all the characteristics of a good lode, and it appears to me to be one of the best speculations I have seen in the district, if we may judge from analogy and its rich neighbours.

WEST TANKERVILLE is in a fine situation, and has good prospects. The engine-shaft is on the Wood lode, and is 60 fms. deep under adit. The mine has returned to the present company 130 tons of lead, for 1807*l.*, and 310 tons of blende, for 1726*l.* 5s., but as the stuff could not be drawn except through Roman Gravels, there is a large accumulation of it underground. The deepest levels in the mine were originally driven in from Roman Gravels, and the south boundary shaft had to be sunk from surface. This is now workable from the 20 fm. level, and drawing will at once commence; though until it is down to the 50 they will not be able to draw stuff from the richest part of the mine. There is a 30-in. pumping-engine and a 14-in. crushing and winding engine on the mine. In the back of the 50 there is a lode worth 80*l.* per fathom, and the mine seems to have every chance of becoming a profitable one when the south shaft gets down to the ore ground.

OLD BATHOLES was formerly included in West Tankerville sett, but is now worked as a distinct company. It is one of the oldest mines in the district, and is 60 fms. deep from surface, or about on a level with the 30 in Roman Gravels. There is an 18-inch engine, and the chief point has been in cutting a great lode under the old workings. This has now been cut into, with fine stones of lead, and the prospects are good.

LADYWELL runs parallel with Roman Gravels, between that and the Grit ranges. There is a 40-in. engine at work, and the shaft is down 16 fms. below adit. There are two lodes, and some very fine stuff of the right sort is coming from the caunter, where two ends are being driven in good ore.

Still further in the same direction there is a new sett, called SHELVEPOOL, on the old Grit lode, which has been cut in an adit level 4 ft. wide, with good rocks of limestone and lead.

WEST STIPERSTONES takes the Roman and Wood veins after they pass through South Roman Gravels, and also has the Bog lode. The chief point of interest at present is to cut the Roman vein at the 40 below adit. This lode was seen in the shaft 10 fathoms under adit, and it was calculated that at the 40 about 11 fathoms would have to be driven to intersect it, and more than half this distance has been accomplished. The Old Stiperstones sett here includes Bog and Pennerley.

The OLD BOG once yielded 400 tons of lead ores a month, and for a long series of years was one of the richest in the country. The chief object of the present company has been to drain the old workings, and this has been accomplished to the 143 fm. level, below the adit of 55 fms. There is a 70-in. pumping and two other engines. The returns by the present company have been 340 tons of lead, for 4592*l.*, and 670 tons of blende, for 3649*l.* 12s. 6d. The present returns are about 25 tons of lead and 50 tons of blende monthly, which does not quite meet cost. There are good prospects, however, of doing much better ere long.

PENNERLEY in olden time was very rich, and Capt. Waters states that on the Big Ore vein as much as 60 to 100 tons of lead ore have been raised per month by six men alone. The returns by the present company have been 1600 tons of lead, for 21,478*l.* 5s.; blende, 83*l.* 10s. The monthly returns are now about 75 tons, and the prospects good. At Potter's Pit the mine is looking particularly well, and further improvements expected. There are three steam-engines, including a 60-inch pumping, and the deepest level is 130 fathoms below the deep adit. Bog and Pennerley are under the management of Capt. Harris, and it is a somewhat singular coincidence that 22 years ago, in 1851, when on a mining tour in North Wales, accompanied by the same friend who is with me now, at the first mine where we went underground Capt. Harris was the resident agent. Again, when we got to Tankerville, just now, the first resident agent I saw was one who was at work in a mine in Scotland when I went underground there nearly 20 years ago. Both have migrated to "fresher fields and pastures new," and may success reward all their efforts.

NORTH TANKERVILLE was extensively worked in olden times from the deep adit to surface; and some fine rocks of ore are still being broken by tributers. A winze is to be sunk below this place, and it may throw great light on the future prospects of the mine. The engine-shaft has been sunk on rather a poor lode, but the ground changed for the better 7 fms. below the 14, and in about 3 fms. deeper a cross-cut will be put out to the best part of the lode. About 7 tons of ore have been sold at 16*l.* per ton.

CENTRAL SNAILBEACH looks in a splendid situation, and has a fine looking chimney-stack, but after spending a very large sum of money—some say as much as 20,000*l.*—the engine has been stopped, and operations commenced in another part of the sett, called Mutton Dingle. The large sum of money referred to has been spent *in shale*, but where they are now working, I understand, is in the right strata, and it is hoped success may yet reward perseverance.

PERKINS BEACH has sold 360 tons of lead for 4580*l.* I did not go to the mine, but the principal point of operation, I understand, is in driving the south cross-cut to reach the White Spar lode. Most of the ore sold was got from the old workings.

The VAN MINE (Llanidloes, April 8).—It is just about four years since I last visited this mine. At that time I was several hours underground; to-day I have limited my inspection to the surface works, which are most extensive and complete, and reflect the greatest credit upon Capt. Williams and his son, by whom I believe they have been chiefly designed and carried out. The mine itself is a great and acknowledged fact, and nothing that I could now say of the underground department would add much to the general knowledge respecting it. When here in 1869 the present company had just commenced operations, the deepest level was 15 fms. below the deep adit, and there was a very general impression that the enormous deposit of ore then laid open above the 15 would not hold down below the level of the valley. Bryntail, now called Van Consols, had been for a time nearly as rich, but had failed in depth, so had Pen-y-clyn, and for these reasons chiefly the Van Mine was sold to the present company for 45,000*l.* In the *Mining Journal* of the 6th March, 1869, I wrote a report of my impressions of this mine after being three hours underground, gave peculiarities of strata, &c., and finished by saying—"Should the next level prove as rich as the 15 the mine will undoubtedly take rank as one of the richest in the kingdom." The next level did prove rich, and the sales of ore from 1869 to the end of 1872 were 17,850 tons of lead, for 238,588*l.* 12s., and 4160 tons of blende, for 13,936*l.* 10s., while the profits divided among the shareholders have been 120,750*l.* The present returns realise 8000*l.* per month, and a profit of about 4000*l.*; and as the lode has been cut at the 60 fm. level—I saw a splendid block of lead which had been broken from it—and as the reserves of lead ore are enormous, the mine has before it, should nothing unforeseen occur, a long and prosperous career.

The works are two and a half miles from Llanidloes, up a mountainous road, and when I was last there the lead was sent down in carts, and the coals and the materials got to the mine in the same way, at very great trouble and expense; sometimes the carts stuck by the way, and the lead was left in the road all night. A railway, therefore, had to be made, at a cost of 18,000*l.*, from the dressing-floors to the main line, about six miles away, and along this upwards of 1000 tons per month of lead, blende, and materials are carried to and from the mine. In fact, everything that skill and ingenuity can devise to utilise, as well as economise, labour and expense, from the breaking of ore underground to placing it ready for the smelter in the railway trucks, has been done, at a great but necessary cost, for the benefit and advantage of the company. The formation of the ore is very peculiar. In some places the lode is several fathoms wide, and worth 10 to 20 tons of lead ore per fathom. In others it becomes small and unproductive. In fact, it opens out from small pipes to huge deposits of lead, and from these again to smaller deposits alternately. The lode is also accompanied by an enormous "flookan," called "sticking;" it is richest in the hard rock by the side of it. And as the lode is too wide for the levels to be supported by timber, they have to be filled up with rock as the lead is taken away. Gas also flows from the levels, and sometimes with such force that the men are smothered with water and debris, and have to run for a time.

EAST VAN, under the same management, has been at work some time, and will in about a month or six weeks tell a tale as to its future prospects. A few months ago some disappointment was caused by the lode being cut into poor. Since then, 30 fms. have been driven without again touching it; very soon, however, it will be cut into, and again tested, and the agent is very sanguine as to the result. Indeed, Capt. Williams tells me that he considers the prospects superior to what they were at the same stage in Van, and he looks upon East Van as the best speculation to be found anywhere.

Adjoining Van, to the west, is PEN-Y-CLYN, which formerly made great returns shallow; but there is not much doing now that I could learn, but I did not go to the mine. Next to Pen-y-clyn, and on the other side of the next mountain from Van, is—

VAN CONSOLS, formerly worked as Bryntail. It is about four miles from Llanidloes, and up one of the vilest roads I ever travelled. Some years ago, and for a long time afterwards, it was pretty generally denied that the mine was on the Van lode. My own opinion, and it has been several times freely expressed in the *Mining Journal*, has always been—1, That it *was* on the Van lode; 2, That large deposits of lead would be found in the virgin ground between Old Bryntail and Pen-y-clyn; and 3, That few better speculations could be found than mining in this piece of ground, situated, as it is, *between* two enormous deposits of ore. But it appears to me that little was done to prove this before Capt. Roach became the manager, about twelve months ago. A very large amount of money was expended on barytes works, and in trying chemical experiments, which were to result in profits sufficient to pay 5 per cent. on the capital of the company, but are now idle. Captain Roach, who was manager of the Old Bryntail when I was a shareholder in it, more than twenty years ago, knows the district well, and has done his best in twelve months to open out the lode; but soon after being made manager the money of the company had become expended, and fresh capital had to be raised for the underground works, and to make a tramroad along the valley of the Severn to carry ores and materials to and from the mine; also for dressing-floors and an incline tramway from the works to the crushing-mills and floors, and all this has kept him pretty well employed. The latter tram has been made, and is about 200 yards long, worked by a wire-rope. The dressing-floors, which will be most complete, well arranged, and of the newest description, are getting well forward, and must cost, I should think, at least 3000*l.* But the tramroad from the floors to Llanidloes, without which it is impossible for the mine to be worked on an extensive scale, has not yet been commenced.

In regard to the underground department, which I did not see, but which was explained to me by the plans and sections of the mine by Capt. Roach, a considerable quantity of lead, probably 200 tons, has been raised, and is ready for dressing, and between Gundry's and Little's shafts, and around the latter place there is also a considerable quantity laid open for stoping above the deep adit, called the 45 fm. level. Below this point, which is the deepest at this part of the mine, a winze has been sunk 3 ft. in lead, and worth at the rate of 200*l.* per fathom. The 45 fm. level end, going towards Van, is poor, but may soon open out again. The 55 (called 60) is in course of driving to get under the rich winze, but at present is 50 fms. behind it, and the 75 more than 200 fathoms. The mine is worked by a water-wheel, but when the levels get extended into ore, and under the deep adit, it will be necessary for safety to have a steam-engine. That the mine will turn out a great and profitable concern when more fully developed I have no doubt whatever, but a little more time and money are required to open out ore ground, and get the lead to market in any quantity.

[*To be continued in next week's Journal.*]

THE "ELVAN COURSES" OF CORNWALL.

Considerable discussion has taken place during the past few months concerning the nature and influence of elvans, but nothing approaching a satisfactory solution has been arrived it; is is gratifying, therefore, to find that the subject is now to be thoroughly ventilated. Mr. John Arthur Phillips, F.C.S., whose name is already associated with investigations connected with practical mining in Cornwall, has offered, through the Miners' Association of Cornwall and Devon, two prizes for papers on the "Elvan Courses" of Cornwall. The competition is open to all present and former pupils of the Miners' Association, and the subjoined are the conditions to be observed by the competitors:—

"1.—Each paper to be accompanied by illustrated specimens of the 'elvans' described.—2. These specimens to be freshly broken, about 4 in. square and 2 in. in thickness.—3. The situation, size, direction, and underlie to be given in the case of each 'elvan course,' together with a description of the effects produced by it on the lodes in its vicinity. Illustrated diagrams to be furnished when necessary.—4. In all cases the mineralogical characteristics of the different 'elvans' must be given in detail, and the various associated minerals noticed.—5. Each rock specimen to have firmly attached to it a legible label, stating locality, whence obtained, and having such distinctive marks as may serve to identify it with the description contained in the text.—6. The specimens of 'elvan' accompanying successful papers to become the property of the giver of the prizes.—7. The papers and illustrative specimens to be deposited with Mr. J. H. Collins, F.G.S., hon. assistant secretary of the Miners' Association, Polytechnic Hall, Falmouth, on or before Sept. 1, 1873."

Mr. R. Hunt, F.R.S., the Keeper of Mining Records at the Royal School of Mines, and Prof. Warington Smyth, F.R.S., have kindly undertaken to decide on the merits of the several papers, and the author of the best will receive a prize, in books, selected by himself, of the value of 5*l.*; whilst a second prize, also in books, will be awarded to the paper next in order of merit.

THE METALLIFEROUS WRALTH OF SCOTLAND—GOLD AND SILVER.

The proposal to re-work the minerals in the Earl of Hopetoun's property at Hilderston Hill causes considerable interest to attach to the early account of the working of the mines of that locality, and as "Ane Account of the Silver Myne at Hilderston Hills" is given in Sibbald's Supplement to his "Prodromus," preserved in the Advocates' Library at Edinburgh, this is readily obtainable. From this manuscript it appears that "the mine was found by a collier named Sandy Mund, who found a heavie piece of Red Metal as he digg'd near to ye water of Hilderstoun. it was raced with many small strings like to hairs or threads. it had descended from a vein thereof, where it had engender'd with the sparr stone. he found likewise a piece of Brownish spar stone which was massie. He brock it with his mattock and it was white and glittered within like unto small white copper Keese which tryed proved a rich ore." It seems, moreover, that the vein was once found 2 in. thick by measure, carrying a course of native silver worth 4s. 6d. per ounce. At one place the vein carried 24 ozs. of fine silver to the hundredweight, and was valued at "six score pounds sterling the tun." But when the mines became the king's, and were wrought by his order, it was not then so rich in silver; the white spar and red metal, which did not prove so rich in depth, were mixed together and taken to London to be smelted, but "smal profit did arise from it and scantly it payed charges of coals and wages which were dear ther. But Mr. Atkinson did in Scotland with peats and stone-coals at a reasonable price and did more in Scotland in one day than he could doe in three in London and with profit. the Red metall till it came to 12 fms. deep remained good, but from thence unto 30 fms. deep it proved nought it was quite altered in quality but not in color, fashion, and heaviness."

The value of the ore obtained at different times seems to have varied considerably, and it would appear that in some cases the metal was in the form of native silver, for some trials are reported to have yielded 80 lbs. of silver to the hundredweight, others 60 lbs., 40 lbs., 35 lbs., and 20 lbs., and in many only as many ounces. The present tenants have made considerable explorations in the old workings and in the ground adjoining, but silver has not been discovered; arsenious sulphuret of nickel, however, has been met with, and oxide of nickel in the rubbish heaps, and it is thought that, altogether independent of the silver ore, the old mine would have been a valu-

able one for nickel. The present company has been formed with a capital of 14,000*l.*, in shares of 10*l.* each, and is offered as a fair speculative investment. The value of the machinery and plant (1280*l.*) is to be paid in cash, and 3020*l.*, the balance of outlay actually incurred, in fully-paid deferred shares, not entitled to dividend until 15 per cent. per annum dividend has been paid on the ordinary shares, so that the terms of purchase are decidedly favourable.

FOREIGN MINES.

SAN PEDRO.—Richard M. Kitto, Feb. 14: New Shaft: Twelve men are engaged at the 150 in cutting two plats and driving a level west towards the Manto San Pedro. Since cutting these plats we have not been able to draw much metal from the upper levels; it takes the horse-whim more than half the time drawing poor stuff from here. This must be kept going both day and night, as everything is depending on this bottom level. I have never seen more congenial strata for copper than this. The end at the 135, driving south of west, is producing good stones of yellow ore. The stopes in the back of the 135 are all communicated with the 128. We have cut the wall of manto in the 128 driving north; for that reason it is suspended. A stope in the back of the 128, on the south part of Manto, will produce 10 tons of 16 per cent. ore per fathom. A stope in back of the same level, on the west part of Manto, will produce 12 tons of 16 per cent. ore per fm. A chiffon sinking below the 122, on the south part of Manto, is producing good stones of ore; this is sinking for ventilation. The new tribute pitch in the back of the 122, north of new shaft, by ten men, at ¼ tribute, will produce 4 tons of 20 per cent. ore per fathom. A tribute pitch in back of the 110, south of new shaft, by four men, at ¼ tribute, will produce 2 tons of 25 per cent. ore per fathom; this ground all came together when the shaft fell in in 1863. There is plenty of ore ground from this point up to the adit level, but the difficulty just now is how to draw the stuff. I beg leave to state a few of the difficulties we have got and shall have to contend with until the machinery is here and working. In the first place, all the best part of the manto was taken away by the former workers from the 110 to the 128; all this space is entirely kept open by means of large timber, now the only thing safe to do is to take away the ore that is left standing by them, and that will pay to take away, and fill up all this open space. This is what we now doing, and as yet we have not drawn a poor stone to surface; this will take a large number of workmen—some building walls, some bringing stones, and others packing the stuff close together, and to draw all this stuff from the depth of 150 fms. from surface with a horse-whim. The ore that can be drawn is very little to be compared with what we require to be drawn if the machinery was erected. The manto unwrought, the same as it is in the bottom of the 122 to the back of the 150, could be taken away for less than half what it is now costing. You will ask—if it is so expensive to remove, why not let it remain as it is? The answer is—because the mine would never be secure while it was suspended on timber, and this is always rotting. You must not think by this explanation that the mine is worse than it was last October. We have the same prospects in the bottom, and as soon as the machinery is erected we shall be able to take out at least 10,000 quintals of we will say 25 per cent. ore per month. In the meantime we have got to make preparations, and to cut the manto in the bottom of the mine. Santa Helena Mine is suspended for the present, as well as the San Antonio and the Cuba.

SIERRA BUTTES (Gold).—Result of the working of Sierra Buttes Mine for March, received by telegram on the 12th inst.:—Sierra Buttes Mine: Receipts, $36,787; cost of mining and milling, $17,513.

THORNHILL REEF.—The directors have advices, dated Feb. 27, from their superintendent in Australia, Mr. Wm. Salter, who reports that the completion of the great engine is being pushed on with all speed, and that he was expecting to be able to hire a portable engine to commence crushing at once. He writes—"We have an immense quantity of ground opened up, with levels and winzes both north and south of the engine-shaft. The gold in the 300 and 450 ft. levels has been seen for a greater distance along the course of the lode than in many of our most remunerative mines, so that all we have to do now is to crush away as fast as possible. The result of the first crushing has already been wired and published.

SWEETLAND CREEK.—A telegram from the superintendent, G. D. M'Lean: We have washed 24 days only since last run. Gross returns, $11,000. Tunnel cost $4000; paid for timber, $1500. Profit, $6000. I send you a remittance of $5000. Shaft up.

MALPASO (Gold Washing).—Telegram from the general agent: We have cleared up after a run of [number of days undecipherable]. The gross returns are $2000.

PACIFIC.—J. D. Pringle, March 22: I last wrote you on the 9th inst., have since to acknowledge receipt of your cable of March 13, also letter of Feb. 22. Your cable was answered immediately. There is a fight improvement in the appearance of the mine during the last week. Taking out some good ore from the 400 ft. level on Batters' ledge. The repairs to boiler and engine have proved to be very beneficial; formerly 1¼ cords of wood were consumed in 12 hours run. Since the repairs were made ⅝ of a cord is the amount consumed in 12 hours. The repairs on water shaft are completed down to the 500 ft. level; below that point extensive repairs are necessary: 40 feet of the shaft is filled with waste dirt and rubbish. This must be removed and be re-timbered; the expense will be nearly as much as it would be for sinking 40 ft. in new ground. The repairs and current costs of the mine have all been paid for from ore taken out during my administration, besides paying many of the old debts. I have on hand at present writing about $2000; this amounts I feel at liberty to draw against, and will expend it in the most economical manner in paying current costs of the mine. Hoping that before it is all expended other bodies of ore may be found of sufficient quantity to put the mine on a paying basis.

ALMADA AND TIRITO.—Mr. Clemes: Profit for February, $7022, equal to 1404*l.* 8s. sterling. Profit for the month, after deducting the London expenses, 1278*l.* 8s.

HOLCOMBE VALLEY (Gold).—C. R. Bennett, March 15: The Mammoth incline is timbered to the depth of about 73 ft., and the old incline to the same lead cleared and timbered to about 45 ft. The disinclination on the contractors' part to continue his contract on the main shaft has been satisfactorily met and arranged by Mr. Haley, and the work is progressing. Some fine specimens of quartz, showing visible gold, have been found on the dump of ore round the Mammouth incline. Mr. Bonner is expected here in a day or two to commence cutting the saw logs and repairing the mill. The weather seems to have settled at last, and the snow is disappearing fast every day.

I. X. L. (Gold and Silver).—Mr. L. Chalmers, March 24: Notwithstanding the increase of water from the thawing snow, we have sunk and timbered 9 feet of the engine shaft. You may have some idea of the increase of water when I tell you that for four or five days we have been burning two cords of wood in 24 hours to make steam for the pumps, in place of one cord as formerly. We have the water under perfect control, but cannot sink quite so fast as when we have not so much of it.

EXCHEQUER (Gold and Silver).—March 24: On the 17th, 18th, and 19th we were hoisting water day and night, and could only just keep it down. The shaft is too shallow yet to put in pumps, we should have to shift the pump and pipes too often: we have, therefore, to use buckets. Finding that almost all the water is coming in between the surface earth and bed rock at about the 20 and 25, I gave orders to run a drain tunnel to intercept it. The tunnel will be 50 feet, and will keep away this surface water in all time coming. During the 20th, 21th, and 22nd, I have run 16 feet of this tunnel, and will soon push it through to shaft, when we shall have no more trouble; the delay is provoking, but inevitable. The men work well.—Mill: The pan floor is half finished, the old dust floor removed, and the engineer busy fitting pan and settler gearing, but there is still a good deal to do, and I have lost one of my best carpenters. You may rely on my pushing things as hard as I can.

JAVALI.—Captain Sohns, March 6: There are 888 tons of quartz crushed, yielding 322 ozs. 19 dwts. of gold. Expenditure for the month, $2282·40. The remittance is 572 ozs. 19 dwts., including the gold obtained during the few days' working of the mill in the month, and is valued at $7750.

CHONTALES.—The directors have advices from Mr. Smeddle, dated March 5: I have to inform you that during the past month we have been chiefly engaged in progressive works, and repairing and altering machinery. The quantity of quartz reduced has been 450 tons, from which we have obtained 95·6 ozs. of gold, being an average of 4¼ dwts. per ton; from old copper plates and cleaning up around stamps we have obtained 67 ozs., making a total of 162·600 ozs.

The total cost for the month has been	£592	18	6
We value the gold obtained at	455	5	7
Leaving a debit balance	£237	12	11
In the costs the following are included—			
San Sebastian Mine and tramway	£134	7	2
Repairs and alterations to stamps	132	13	1
New stamps	15	10	4
Freight of machinery	3	15	4
Total	£286	5	11

Santo Domingo: I enclose a section of this mine, showing the portions extracted during the month. In the No. 3 level, deep cross-cut, we have driven 41 ft. west on course of the lode, which is now upwards of 6 ft. wide. I have had 15 tons from this level crushed separate, and am pleased to inform you have obtained a very payable result, the amount of gold obtained being 3 ozs. 12 dwts., or at the rate of nearly 5 dwts. per ton. With regard to the prospects of the mines, we have undoubtedly proved the lode in St. Domingo deep cross-cut to be payable. When it is remembered this is the deepest level we have, I need not say how important a feature I consider it in the future of these mines. It also proves the fallacy of estimating the value of the lodes by washing in a horn spoon; by the latter process scarcely the colour can be obtained. It also substantiates what I have previously stated, that when the gold is not found in a free state it may be expected in the ore, and to obtain it very fine gratings must be used. Of course, when the free gold only is sought after, it does not matter how coarse the gratings used may be, fine pulverisation being unnecessary. The stamp-boxes in which the ore was crushed were new, also the false bottoms and shoes: it may, therefore, be fairly estimated that at least 1 dwt. per ton reemained in the boxes. The captains in their report state the value of the lodes as usual; but, as I have before stated, it only refers to the free gold, and the only satisfactory means of ascertaining the value is by reducing a few tons separately. The health of the establishment continues good.

March 4.—Herewith we beg to hand you our report for February.—East San Benito Mine: The No. 1 stope in the back of No. 2 level, west of cross cut, has been stoped 30½ varas; lode 5 ft. wide, worth 5 dwts. of gold per ton. A rise in the back of the same level has been risen 8¼ varas; lode 4 ft. wide, worth 3 dwts. of gold per ton. The No. 3 stope, in the back of the No. 2 level, east of cross-cut, has been stoped 7 varas; lode 4 ft. wide, worth 3 dwts. of gold per ton.—Santo Domingo Mine: A stope in the back of the intermediate level, east of cross-cut, has been stoped 30½ varas; lode 4½ ft. wide, worth 3 dwts. of gold per ton. The intermediate level has been driven east 9½ varas; lode 5 ft. wide, worth 4 dwts. of gold per ton. A rise in the back of the deep level has been risen 10½ varas: lode 4 ft. wide, worth 2 dwts. of gold per ton. The deep level has been driven west on the lode 15 varas; lode 6 ft. wide. A level on the top of the mine has been driven about 6 varas; lode 4 ft. wide, worth 6 dwts. of gold per ton.—San Sebastian Mine: During the month we have cleared out and partially repaired the main level, and in the end found a lode 5 ft. wide, of a very promising appearance. We have also laid down a considerable portion of the tramway from the stamps, and hope in another month to complete the same to the bridge. The number of tons sent to the stamps is as follows:—From East San Benito, 193 tons, yielding 4½ dwts. of gold per ton; from Santo Domingo, 257 tons, yielding 4¾ dwts. of gold per ton: in all 450 tons, equal to 95·600 oz. of gold.—D. TONKIN, FRANCISCO VELASQUEZ.

BENSBERG.—J. W. Hoffmann, April 12: In the open-cast we are still working as last week on the vein of carbonate at the west end, and there is no material alteration to report. Our delivery of ore has been limited through scarcity of railway wagons. Of the dressing machinery we are now busy fixing the steam elevator, and shall commence at the jiggers next week. We expect a further delivery of machinery from the makers to-day (April 12). Production of ore for the week:—Carbonate, 40 tons; average assay, 50 per cent.; rock ore, 95 tons of 10 per cent. average assay. Delivered 40 tons carbonate of 50 per cent. average assay. Stock on hand, ready for market, 80 tons of 50 per cent. average assay.

[For remainder of Foreign Mines, see to-day's Journal.]

AUSTRALIAN MINES.

YUDANAMUTANA.—The Superintendent writes: I have much pleasure in being able to report a slight improvement in the returns for the last three weeks, and trust that with perseverance Capt. Cornelius will be able to continue the same.—Returns from Jan. 24 to Feb. 24: Copper made, 20 tons 13 cwts. 1 qr.; copper dispatched, 19 tons 6 cwts. 3 qrs.; copper on hand, 5 tons 2 cwts. 2 qrs.

PORT PHILLIP AND COLONIAL (Gold).—Clunes, Feb. 26: The quantity of quartz crushed during the month ending Jan. 29 was 4078 tons; pyrites treated, about 10 tons; total gold obtained, 727 ozs. 3 dwts., or an average per ton of 3 dwts., 13½ grs. The receipts were 2837*l.* 9s. 2d.; payments (including 904*l.* paid for firewood and timber, and 433*l.* for machinery and stores), 4192*l.* 1s.: loss, 1354*l.* 11s. 10d., to which was added last month's debit balance of 2494*l.*, making a total debit balance of 3848*l.* 11s. 10d. The apparent loss on the month's operations is attributable to the extra payments, which amount to 1337*l.* During the three weeks ending Feb. 19 the quantity of quartz crushed was 3248 tons; total gold obtained 544 ozs. 4 dwts.; or an average per ton of 3 dwts. 8 grs.

— Telegram from the resident director, dated Melbourne, April 10, "Yield per ton 4 dwts. 14 grs. Deep level stope and south drive improving."

ANGLO-AUSTRALIAN.—Capt. Raisbeck, Feb. 27: East Shaft: We have sunk since the above date 10 ft., taken out ground for a chamber, west of shaft, at the 260, 12 ft. by 10 ft. by 10 ft.; will finish same in four days, when we will commence sinking. In cross-cutting for chamber, 5 ft. west of shaft, we passed through a flookan 6 in. thick, with strong veined quartz, underlying east 2 ft. in the fathom. When such veins as this come in conjunction with the eastern lode we may expect the lode to be greatly benefited by it. Where the eastern lode has been worked, south of the Anglo, it has invariably made gold where such feeders have dropped in from the west. Present depth, 262 ft.—West Shaft: We have driven in the cross-cut at the 220 ft. level 14 ft., where we touched the western wall of the lode. In order to have communication with and ventilate the mine we have driven north on the eastern part of the lode 27 ft., and risen 18 ft. same; we will have to rise 30 ft. more to hole to the winze sunk in the cross-cut at the 130. I have not seen gold in the drive or rise, except yesterday, when I saw several stones with gold. I have 20 tons of stone in the mill, taken from the north drive, to test the quality of stone. I have two men prospecting at the south end of the hill (Ferron's line); they are down 30 ft., not a sufficient depth to touch the leaders.

AUSTRALIAN UNITED.—Mr. Lamb, Feb. 28: The poor yields for the few days previous to yesterday were caused by another burst of water last week. The mine captain's report has not reached me; I presume Mr. Kitto is sending it. The largest nugget yet produced from your mine (over 6 ounces) was in yesterday's machine, and the captain informed me that the wash dirt at the eastern end of your mine was improving greatly, the gold getting much coarser. No letter has come to hand from Mr. Kitto, nor is the captain's report received.

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated Feb. 24: The manager reports that the strike of the colliers, referred to in the last published advices from the colony, was brought to an end, as regards this company's Lambton Colliery, on the 29th of January, on which day the company's miners resumed work. The quantity sold during the few days of work in that month was 2692 tons. From the termination of the strike the company had done a full trade, the price being 12*s.* per ton from the time when all the collieries resumed work. During a few days after Jan. 29, when Lambton was the only colliery at work, the company's coal was sold by the manager at the exceptionally high price of 25*s.* a ton at Newcastle.

YORKE PENINSULA.—The directors have advices from the Committee of Inspection at Adelaide, dated Feb. 26, with reports from the Kurilla Mine to the 24th. Capt. Anthony reports that the 15, west of Deeble's, has been driven 5¼ fms., the lode averaging 1 ft. wide, composed of clay-slate, mixed with iron, iron pyrites, and black ore. The 25, west of Deeble's, has been driven 3¼ fms., the lode averaging fully 2½ ft. wide, composed of quartz, iron, iron pyrites, and copper ore. Total driven, 50 fms. west of Deeble's shaft. The lode throughout would be considered by any practical miner worthy of sinking a shaft and driving on it at greater depths. Capt. Anthony's very strong recommendation to the board continues to be that such a shaft should be sunk. An increased demand for allotments of the company's townships of Aberdeen on the Bon Accord property had arisen, and the committee advise by the above-mentioned letter the sale of six of them, on one of which the purchaser was to erect another hotel and store in view of the traffic that must pass to and from the railway terminus in the centre of the township to the northern runs. The committee state that "this cannot fail to improve the value of adjoining allotments."

As having an important bearing upon the prospects of the Kurilla Mine, the following extract from the *South Australian Register*, of Feb. 28, will be perused with interest by the shareholders of this company. The Devon Consols Mine immediately adjoins the Kurilla Mine, and the lodes in each are found to run in the same direction:—"There has been great excitement on the Peninsula in consequence of a branch of ore that was being followed on the Devon Consols Mine suddenly developing into a magnificent lode of yellow ore coated black, now 6 ft. wide, without the dimensions being known. The lode is directly parallel with, and not far from, the great Wallaroo Mine lodes. Mr. W. W. Hughes, it will be recollected, recently made an offer to furnish money on terms to develope the property with. The lode which has been cut through is about 10 ft. in width, and of a greater size than that in the adjoining Wallaroo Mine, and, therefore, the largest yet cut on the Peninsula; over 20 tons of ore have been raised to the surface of an extraordinary rich character. It is thought that the Devon will be compelled to erect machinery and employ a considerably greater number of hands before it takes its place among the dividend-paying mines. The price of shares rapidly rose from under 20*s.* up to 7*l.*, and the discovery is believed to be permanent."

THE DEVON CONSOLS.—There has been great excitement on the Peninsula in consequence of a branch of ore that was being followed on the Devon Consols Mine suddenly developing into a magnificent lode of yellow ore coated black, now 6 feet big, without the dimensions being known. The lode is directly parallel with and not far from the great Wallaroo Mine lodes. Mr. W. W. Hughes, it will be recollected, recently made an offer to furnish money on terms to develope the property with. The lode which has been cut through is about 10 feet in width, and is of a greater size than that in the adjoining Wallaroo Mine, and, therefore, the largest yet cut on the Peninsula. Over 20 tons of ore have been raised to the surface of an extraordinary rich character. It is thought that the Devon will be compelled to erect machinery and employ a considerably greater number of hands before it takes its place among the dividend-paying mines. The price of shares rapidly rose from under 20*s.* to 7*l.*, and the discovery is believed to be permanent.—*South Australian Register*, Feb. 28.—[The section on which the Devon Consols Mine is situate immediately adjoins that on which the Kurilla Mine is being developed. The lodes in both mines run in the same direction.]

COALS AND COKE.—Since our last the Newcastle strike has been settled, and we now quote New South Wales coals at 27*s.* to 28*s.* per ton. English coals have been quoted at 70*s.* per ton, and coke at 6*l.* per ton.—*South Australian Register*, Feb. 28.

MAMMOTH COPPEROPOLIS OF UTAH.

SIR,—In obedience to your verbal instructions, I went to Tintic district on the 8th inst., and during the two days following made an examination of the Mammoth Copperopolis Mine, and respectfully submit the following brief report:—Tintic Mining district is situated in the Oquirrh range of mountains, about 25 miles south of Camp Floyd district, and west of the southern end of Utah Lake. The principal line of approach at present is by the Utah Southern Railway to Lehi, near the north end of the lake; thence by wagon road along the west shore to the mouth of Tintic canyon, thence up the canyon to Homansville and Eureka, two small villages situated in the low pass that extends through the Oquirrh range to the valley west of it. The distance from Lehi by wagon road to the town of Eureka is about 50 miles; the other line of approach is from Salt Lake City by the way of Stockton, down the valley west of the Oquirrh range. That portion of the Oquirrh Mountains included in Tintic district is very much broken into rough, irregular spurs and isolated peaks, with deep gorges and low passes between them. The geological formations are composed of limestone, quartzite, metamorphic shale, and large belts or zones of irruptive rocks, that cut through the range from south-west to north-east. The stratified rocks have been greatly disturbed by the plutonic or irruptive rocks, and are broken and tilted into all sorts of irregular positions. A marked peculiarity of the irruptive rock is that at the south-west portion of the district it is syenite or hornblendic granite, but as you go north-east it assumes a porphyritic character, resembling kyolite; and, finally, north of Homansville it approached closely the the character of a trachyte, with hornblende, and disseminated crystals of glassy felspar. The metal-bearing rocks, or the formations in which the veins occur, are the lime strata, quartzite, and the syenite, in the south-west portion of the district.

The Mammoth Copperopolis Mine is situated in the limestone formation in the west flank of the range, about two miles south of the town of Eureka, and nearly the same distance north of the town of Silver, or Silverado. The lime stratum at the mine dips east 25°, and strikes north and south. The lode strikes north 5° west magnetic, and dips west 75°, consequently cutting the lode at right angles to the bedding or stratification, hence it must be classed as a true fissure lode: the limestone stratum cut by the lode is highly crystaline and silicious, and may be called granular limestone, somewhat shaky in some of the beds, and compact and hard in others. Nodules, bands of flint or limestone, are common in portions of the strata; the organic remains, such as corralines, moluska, &c., are so far obliterated by crystalisation that no distinct specimens are observable, hence the geological age of the strata is doubtful: the probabilities are that it is Devonian, or Upper Silurian. About 1500 ft. below the outcrop on the lode the limestone is underlaid with a heavy bed of white compact quartzite, as shown in the accompanying geological section. The power or thickness of the lode is variable at some points, which is not more than a foot or two between the walls; in other portions it extends into immense chutes or chimneys from 2 to 30 ft. wide, and extending on the line of the lode from 50 to 300 ft.

The largest outcrop and most extensive chute of ore is in the south hill, as shown in the rough diagram. This chimney, or enlargement of the lode, is from 6 to 30 feet thick, and at least 300 feet long. The explorations in this part of the lode consist of a large open-cut on the north slope of South Hill, and a shaft sunk 66 ft. deep below the bottom of the cut, or 96 feet below the croppings, 48 ft. below the floor of the cut, or 78 ft. below the croppings. The level has been run south of the shaft on the lode 101 ft., and north of the shaft 37 ft., making a total exploration of 138 ft. in length north and south, and 96 ft. deep. These explorations, taken in connection with the large outcrop entirely across South Hill, leave no room to doubt the continuity and great strength at this portion of the mine. I think it is perfectly safe to estimate 15,000 tons of good ore in this portion of the mine (South Hill): 300 ft. long by 100 feet deep, and an average of 10 feet thick, will give 15,000 to 20,000 tons of ore. The gross value per ton of 2000 lbs. is more difficult to obtain, but full tests of the ore have been made in the large way by taking several tons of the lode from wall to wall, and having it crushed and carefully assayed. The value, as given by J. McVicker, (say) $9 gold and $7·64 silver. Average tests made by Mr. Couch across the face of the open-out, 30 ft. wide, give $95 silver. Judging from numerous tests made by competent parties, the gross value will range from $75 to $100 per ton in gold and silver, say—at of $80 per ton. This would give in gross value, within the bounds estimated south half of the mine, something over $1,000,000 for the first 100 ft. below face. I cannot give these estimates as positive and certain, for the reason have not made sufficient tests of the ore at every point exposed. Hence the ledge obtained may not be accurate in every respect, but my belief is that have been fairly made and can be relied upon. Mr. Couch, the present at the mine, is a careful, competent, and reliable man, and I would trust sample a mine for me, and feel secure from any misrepresentation of the large amount of ore has been shipped from the mine and thoroughly there can be no mistake as to the general character and value of the ore.

A general statement of the amount of ore shipped, and the assay value of silver, and copper contained, is herewith annexed for reference, a better values than any sampling test at the mine could be. The explorations at the Hill are more extensive; there are three principal shafts sunk to the depth ing:—1st, The Fowler shaft, near the centre of the hill, is down 71 ft.; 2nd, Prospect shaft is down 55 ft., and the level run each way on the lode south and north 80 ft.; 3rd, a shaft is sunk midway between the last-named and the ravine at the south base of the hill; this shaft is down 56 ft. deep in defined vein, but not so large as at the old centre shaft. In addition to these and levels there has been a large amount of work on the line of outcrop, and amount of good copper ore taken out and shipped. By this surface work has been traced entirely through the hill to the north ravine, thus completing surface explorations of the lode nearly the whole length of the claim. The North Hill is not so large and strong as it is in the South Hill. There or four shoots or pipes of rich ore in the hill, with connections at the top between them. The pipes or shoots of ore are from 6 to 15 ft. thick, decreasing thickness each way from the centre of the shoot, until the walls are not over 1 to 3 ft. apart. The average thickness of the lode through the North Hill is 5 to 6 ft. between the walls. This portion of the lode is richer in copper in South Hill, but the gold-bearing quartz is almost entirely wanting; in is but little quartz gangue in this portion of the lode, but the flanges in iron oxide, carbonate oxide, and grey copper ore, mixed to some extent ments of limestone and earthy infiltrations. Occasionally bunches and of true quartz gangue are met with. Green and blue carbonates of copper abundant, and beautiful crystals of azurite and malachite are found in cavities of the lode; red and black oxides are not so abundant, but are association with the carbonates. The bunches of red oxide frequently and threads of pure native copper. The quantity of ore in the north depth of 100 ft. below the surface, is estimated at about 6000 tons, about of which is ore that will give an average of 25 per cent. of copper and silver to the ton; the remaining half will give 10 to 12 per cent. copper of silver per ton. It is somewhat difficult to arrive at a fair estimate of values in the North Hill portion of the lode, but, taking all the ore 100 ft. the surface, I think it safe to estimate the gross value at about $500,000 total gross value in the lode for the first 100 ft. below the surface comes a question of great importance to properly determine the best opening the mine and handling the ores, so as to make the largest margin out of the values contained in the lode.

OPENING THE MINE.—This should be done with the least possible dead work, and I would recommend sinking shafts on the lode where and best shoots of ore are found. The lode appears so near the vertical good guides for the tubs can be easily arranged for hauling, and you the important advantage gained over perpendicular shafting. First, the lode can be wrought at about half the cost per foot that it would be in hard quartz line of country rock. Secondly, by following the lode you the quality of the ore, and getting some return for the cost of sinking. spect the Fowler shaft was a very expensive mistake. It was sunk in country rock, and no substantial advantages gained over the old Prospect sunk on the lode within 30 ft. of it, to a depth of 55 ft. I would also the completion of the two tunnels, one in the centre of the North Hill, and on the north side of the South Hill. These two tunnels can be completed at a comparatively small cost, and they will greatly facilitate the ventilation mine, and the delivery of ores at convenient points for loading trams to ore to the reduction works.

REDUCTION WORKS.—It is a matter of great importance to get such ores blished as will separate the values from the waste with the smallest possible metal, and that can be operated on at the least expense. My opinion is Stutefelt aiken, or any other style of chloridising furnace, is not advisable treatment of your ores, for the reason that the chlorine gas attacks and forms a soluble chloride of gold, which is last in the amalgamating flows away in the tailings. I think the cheapest and most efficient plan of tion is to stamp the ores wet and pass the crushed ores through jiggers from the battery. Below, the jigging mines have a series of large settling which everything that passes through the jigs is collected, and subsequently through the amalgamating pans. In other words, you need a fine stamping silver mill, with jiggers added between the batteries of the stamp apparatus. By this system you will save most of the heavy copper ore in the jigs of the light chloride of silver, and the fine free gold will be settling vats and amalgamated in the pans. The jigs will save most of the base ore in a concentrated form, and thus prevent its interference with gamation with the free ore.

The rich masses of copper ore should be hand-dressed or assorted from the mine, and sacked as at present, to be shipped or reduced by a suitable furnace at the works. I think it would be advisable to nace at once, and reduce all the hand-dressed ore with the profit before it is shipped. In this way you will get your values into form, and make a large saving in the item of freight. In view of dress the ore the stamping should be done with coarse screens, say to the inch. This prevents the reduction of the ore too fine for too much slime. Experiment may prove that even coarser screens able. A good 15-stamp mill worked on this plan will crush and dress of ore per day (24 hours), which is, in my opinion, about an economical the mine per day. According to my estimate of the amount of ore depth of 100 feet from the surface, there is about two years' work of machinery. Notwithstanding this large supply of ore ahead, I am strongly the importance of sinking at least two working shafts to the the South, and one in the centre of the North Hill. If these two 500 ft. deep within two years, and levels extended each way from them of 80 to 100 feet apart, you will be able to continually increase your available resources for two or three years to come. For the next three explorations to the deep should be vigorously and persistently pushed if the work is done on the lode the ore taken out of the shafts and than pay the cost of the work, if the ore continues as rich and abundant as it is to the depth now explored.

I must depend upon you to have a carefully-prepared statement made number of tons of ore shipped from the mine, and the average value per also an approximate of the amount of second-class ore now on the dump, value per ton as near as it may be ascertained by sampling the mass. of my inspection of the mine the dumps were too much covered with admit of any estimate.

In conclusion, I will say that your mine is, so far as I am capable of true fissure vein lode of great power and value, and under skilful should be made one of the best-dividend paying mines of Utah.

Salt Lake City, Utah, March 10. JOSHUA E. CLAYTON, Mining

CARIBOU—THE SILVER KING OF THE WORLD.—On March 10, we got into Mr. Spencer's express wagon and started for the prosperous district of Caribou. The trip was a pleasant and interesting soon came to the new town of Middle Boulder, a lively burg of perhaps a post office, grocery stores, &c. Here is where the large mill of Messrs. Cutter is situated. Two miles beyond we came to the very homey town of About 2 miles from Cardinal is one of the best and liviest mining regions world—Caribou. This town is situated in the valley formed at the head of mountains, where the Caribou, Idaho, Sherman, and other good mines are, make it a very pretty place. Caribou contains about 200 houses, including fine stores, and two large hotels. The society is far superior to that of of its age in the West. Tuesday we began looking at the mines, which is ral topic of conversation with the people, and we might here say that Gibson people ought to talk more about the mines, as it would materially benefit Caribou lode, owned by Mr. A. D. Breed, is a big mine. Mr. Allum, manly foreman of the mine, escorted us through the nooks and crooks of ground workings of this splendid mine. It would require several days shafts and drifts of this mine a thorough examination, so great are the thereof. In a trip of some two hours down in the main shaft we were shown that never met our optics before. Solid veins of mineral from 6 to 6 feet our gaze wherever we turned. The main shaft is down about 340 feet, crevice seems to get better as the y progress towards China. The east Caribou is owned and worked by Mr. W. J. Martin and others, who are with the same success as that in the west shaft. The Idaho lode is owned Jenness, A. B. Chaplain, Joe Westover, and others. The shaft is down on a crevice from 4 to 6 feet wide, that runs from 200 to 800 ozs. per ton. one of the best looking leads in the district, and the owners are very the possession of so valuable a piece of property. The Seven-Thirty in extent next to the Caribou. The main shaft is down only 75 feet, and will average 4 feet with a drift to the east 140 feet on a good vein. Just Caribou is the Sherman lode, discovered by Charley Havens, but is being at present by Messrs. Ash Heim and Frank Wright. They are down about on one of the best veins of mineral in the Territory. When properly are of the opinion that this lead will rival any other silver lode in the west. by the Sherman is the I. X. L., a very fine looking lead, but not well being down only 45 or 50 feet on a 3-foot crevice of 250 to 600 ozs. ore. the I. X. L. is the No Name, owned by J. P. Lesher, Wm. Donald, Joe Lou Smith. This splendid lead is down 95 feet on a crevice 6 feet wide, from 250 to 500 ozs. per ton. Charles E. Sherman has a contract on the and is taking out some very fine looking ore at a depth of only 45 feet. burg is comparatively a new lead, and is down only about 20 feet, with of becoming a good lead. The Federal lode is another one of the lodes fully developed, but has good indications. Dr. Fletcher and a few visiting. Among them were the Monitor, Grand View, Pewarmer, Oriental, and others. It is confidently expected that there will be at least 2000 miners on the mountain sides there within the next two or three which will make it one of the liviest mining camps in the Territory. now moving in there from the States almost daily, who intend making future home. Caribou to-day presents advantages far superior to any other camp of its age in the West, and we predict for it a very bright future. of a proper amount of reduction works has somewhat impeded the of the mining interests, but we understand Messrs. Breed and Cutter ing the capacity of their mill at Middle Boulder, at an early day, which terially benefit the miners, who are at present compelled to ship their ore Hawk for treatment. When proper reduction works are put in Caribou a bigger yield than any other mining district in Colorado, as every mine thus far has proven successful. Taking the mines altogether on an average far excel any we ever saw before in width of crevice, quality of ore, and access.—*Reporter* (Central City, Colorado, March 23).

FOREIGN MINING AND METALLURGY.

...e has been advancing at Paris. Chilian in bars has made ...to in ingots, 98*l.*; tough English, 98*l.*; and Corocoro mineral ...pper), 94*l.* per ton. At Havre there has been very little ...in copper; the stock amounted to 1025 tons of Chilian. ...tions in copper have been very well sustained upon the ...arket, and prices have been tending upwards. The Berlin ...market has been rather quiet, but at Hamburg the article has ...vancing, in consequence of the tone of the advices received ...gland. The Dutch tin markets have been rather active; ...re numerous, but holders have shown no great disposition ...t present rates. There have been comparatively few trans... at Paris. Banca, delivered at Havre or Paris, has made 158*l.*; ...154*l.*; and English, delivered at Havre or Rouen, 153*l.* per ...n has been advancing at Marseilles. The results of the re... of tin by auction in Holland has caused tin to recede upon ...man markets; the article appears likely to regain its former ...French lead, delivered at Paris, has made 26*l.*; Spanish, ...d at Havre, 25*l.*; English ditto, 24*l.*; and Belgian and Ger... delivered at Paris, 24*l.* 8*s.* per ton. Upon the Marseilles ...lead exhibits a fresh advance. At Cologne, as well as at ...nd Hamburg, lead has been in considerable demand, and ...ve exhibited an upward tendency. Silesian zinc has ad... at Paris to 30*l.* per ton. Upon the German markets zinc has ...further tending upwards.

...ate of affairs in the French iron trade exhibits little change; ...ms are not very numerous, and business is sluggish, espe... regards merchants' iron. A slight fall in quotations would ...ring about a revival in affairs, but there appears to be a ge... ...ling of confidence in the maintenance of quotations for the ... Other metallurgical products continue in good request. ...y is absorbing a considerable quantity of special irons, while ...e demand for wire on Russian account. Pig is scarce, and ...emand; refining charcoal-made brings 7*l.* 12*s.* per ton; coke... ...tto. 6*l.* 12*s.*; and casting, 7*l.* 4*s.* to 8*l.* per ton, according to ... The Paris iron market has exhibited little change. The ...of iron of all kinds into France were 40,000 tons during the ...months of this year, while in the corresponding period of ...y were only 32,000 tons. The augmentation observable oc... ...entirely under the head of pig. The imports of iron minerals ...ce increased from 66,000 tons in the first two months of 1872 ...0 tons in the first two months of 1873. On the other hand, ...orts of iron and steel from France declined from 19,000 tons ...st two months of 1872 to 13,800 tons in the first two months ... The diminution arose principally under the heads of rails ...l in bars.

...elgian iron trade remains comparatively quiet, but trade is, ...eless, firm, without any notable variations being observable ...ations. The continued high price of coal, coke, and pig alone ...s the retrograde movement which would, under other cir... ...ces, result from the diminished number of orders forth... ... no very important transaction has been indicated this ... Merchants' iron remains at 13*l.* to 13*l.* 4*s.* per ton for ...nd No. 2 plates bring 18*l.* per ton; pig still continues sta... ...The central committee of the Association of Belgian Iron... ...has held a meeting at Charleroi; the committee fixed the ...nd definitive tariff of the association, which is subject to re... ...very month, and which will be sent regularly to all the mem... ...e founders of the province of Liége have also formed a local ...n, with a similar object. The important mechanical con... ...t establishment of MM. L. and Leon Enthoven, at Molenbeek, ...been taken over by MM. M. de Ville-Châtel, H. Hauman, and ...r. under the designation of H. de Ville-Châtel and Co. The ...f Luxembourg minerals continues to occupy public attention ...m. The Belgian Minister for Foreign Affairs has not yet ...o a request addressed to him on the subject by the Associa... ...elgian Forgemasters.

...has been a slight slackening in the coal trade at Paris, but ...nution in the activity prevailing is attributable to no very ...efined causes, and it has exerted little effect on prices. ...ns are maintained firmly—in fact, more firmly than ever— ...nsible, though not universally accepted, advance is indi... ...Coal for household purposes is quoted at 2*l.* 8*s.* to 2*l.* 12*s.* per ...vered at private dwelling-houses. Freights present few ...s, but it may be remarked that navigations have become ...ular. An enquiry into the state of the coal trade in France ...decided on by the National Assembly. At the same time, ...mbly, notwithstanding the urgent representations of M. ...urs, separated without proceeding with the nomination of ...n members charged with the enquiry. This delay is gene... ...garded as very regrettable. The causes of the present coal ...n France are somewhat complex, and it is not very easy to ...complete remedy. It might be well, possibly, to modify ...ing French legislation relating to mines, which dates from ...d French coalowners are always clamouring for lower tariffs ...proved means of transport. The impending enquiry will, ...y, prove most useful in its indirect results—that is, in the ...al information and discussions which it will be the means ...cing. The imports of coal into France in the first two ...of this year were about equal to those effected in the corre...g period of 1872, having been nearly 1,050,000 tons. The ...of coal from France increased in the first two months of this ...the extent of 48,300 tons.

...mports of German coal which are being made into Belgium ...eting more and more attention. The imports continue, and ...even increasing, as greater apprehensions than ever are en... ...as to the possibility of laying in adequate supplies in Be... ...Stocks, in fact, are very limited, if not almost *nil*, and the ...n of working miners which has been taking place of late ...sed to quite an alarming extent. Every spring the same ...n is observable, and hitherto it has been regarded as bene... ...ther than otherwise, as the diminution in the available supply ...r coincident with a reduction in the demand. But this ...e appears to be no dead season, numerous orders come to ...d the extraction can scarcely keep pace with them, notwith... ...the assistance of the supplies forthcoming from Germany. ...arture of the working miners is, accordingly, an unfortunate ...stances this year for the Belgian coalowners, more especially ...igration has not been so heavy or so general for many years ...it is this season. At Charleroi coal is quoted at 32*s.* to 34*s.* ... At Liége, at Mons, and indeed in all the Belgian basins ...e of affairs is the same; there is the same want of labour ...same absence of stocks. Notwithstanding the arrival, then, ...the Belgian coal trade has not yet escaped from the numerous ...ties which have weighed upon it. The only course open to ...relief for the trade appears to be to diminish consumption, ...e production cannot be much increased. It is the state of ...our market which will now attracts the most attention.

...D OF VICTORIA.—The following statement shows, for the last ...rs, the average number of miners employed in the colony of Victoria, and ...tity of gold produced:—In the year 1866 the number of miners was 73,479, ...yield of gold 1,536,581 ozs.; in 1867, miners 65,857, yield 1,493,831 ozs.; in ...ners 63,181, yield 1,474,187 ozs.; in 1869, miners 68,037, yield 1,367,903 ozs.; ...miners 59,267, yield 1,281,841; in 1871, miners 58,101, yield 1,303,379 ozs.; ...miners 54,651, yield 1,317,102 ozs. It will be seen from this that the labour ...ed in the production of gold was less last year than in any of the six pre... ...while the results were comparatively better. Calculating the value of the ...ained at 4*l.* per ounce, the value of the individual miner's earnings, judging ...e gross results, was in 1866, 31*s.* per week; in 1867, 35*s.*; in 1868, 36*s.*; in ...tle less than 31*s.*; in 1870, a fraction more than 32*s.* per week; in 1871, ...6*d.* per week; and in 1872, a small fraction over 37*s.* per week.

IN QUEENSLAND AND NEW SOUTH WALES.—Amongst the ...ers in the City of Adelaide, from Sydney, was Mr. John Hunt, who has re... ...from a visit to the Queensland and New South Wales tin mines, with which ...he is very favourably impressed, both as regards the existence of rich tin ...the extent of alluvial deposits of tin; but he thinks that unless a more ...tific and legitimate mode of working is adopted many of the companies, ...ut with exaggerated prospects and an unreasonable amount of capital, will ...grief. It is not generally known that diamonds exist in the tin drift as ...other precious stones, over a considerable extent of country in both colonies. ...monds found at Kettle Swamp, near Stanthorp, in one of Hunt's machines, ...on an average, for goodness of colour, any yet found in the colony. Mr. ...who we believe is a practical man, is about to publish a pamphlet on the ...diamond mines of Queensland and New South Wales.—*Melbourne Argus.*

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES and FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.

STOURBRIDGE FIRE BRICKS AND CLAY.

AWARDED TWENTY GOLD AND SILVER FIRST-CLASS PRIZE MEDALS

IMMENSE SAVING OF LABOUR

TO MINERS, IRONMASTERS, MANUFACTURING CHEMISTS, RAILWAY COMPANIES, EMERY AND FLINT GRINDERS, McADAM ROAD MAKERS, &c., &c.

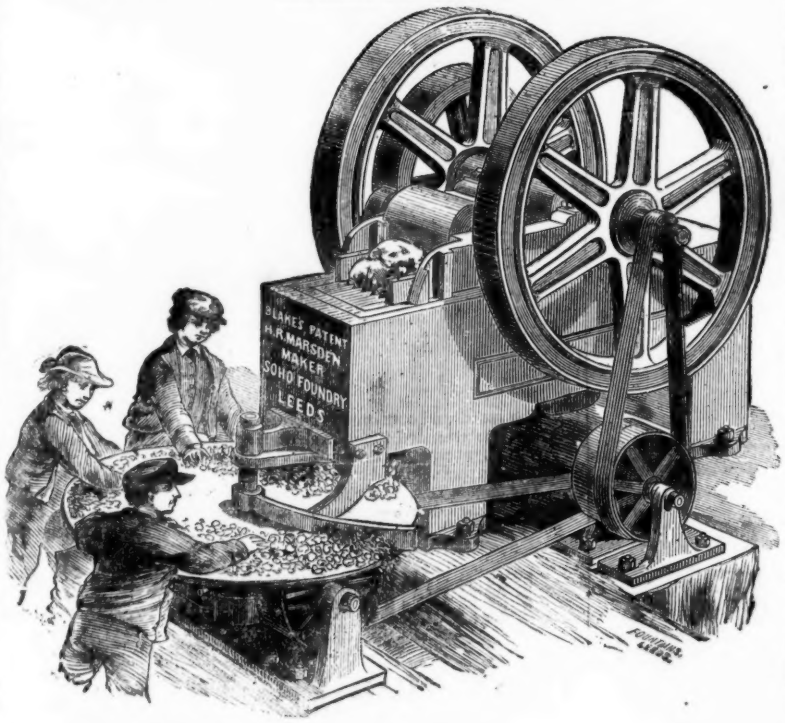
BLAKE'S PATENT STONE BREAKER,

OR ORE-CRUSHING MACHINE,

FOR REDUCING TO SMALL FRAGMENTS ROCKS, ORES, AND MINERALS OF EVERY KIND.

This is the only machine that has proved a success. This machine was shown in full operation at the Royal Agricultural Society's Show at Manchester, and at the Highland Agricultural Society's Show at Edinburgh, where it broke 1¼ ton of the hardest trap or whinstone in eight minutes, and was AWARDED TWO FIRST-CLASS SILVER MEDALS. It has also just received a SPECIAL GOLD MEDAL at Santiago, Chili.

It is rapidly making its way to all parts of the globe, being now in profitable use in California, Washoe, Lake Superior, Australia, Cuba, Chili, Brazil, and throughout the United States and England. Read extracts of testimonials:—



The Parys Mines Company, Parys Mines, near Bangor, June 6.—We have had one of your stone breakers in use during the last 12 months, and Capt. Morcom reports most favourably as to its capabilities of crushing the materials to the required size, and its great economy in doing away with manual labour.

For the Parys Mining Company,
H. R. Marsden, Esq. JAMES WILLIAMS.

The Van Mining Company (Limited), Van Mines, Llanidloes, Feb. 6, 1871.—Our machine, a 10 by 7, is now breaking 180 tons of stone for the crusher every 24 hours. I may say, of all our machinery, that for simplicity of construction and dispatch in their work, they are equal to anything in the kingdom, but your stone breaker surpasses them all. W. WILLIAMS.
H. R. Marsden, Esq., Leeds.

Chacneater, Cornwall, Jan. 27, 1869.—I have great pleasure in stating that the patent stone breaker I bought of you some three years ago for mines in Chili, continues to do its work well, and gives great satisfaction. It crushes the hardest copper ore stone—put it through ½ inch size by horse power—with great ease. I can safely recommend it to all in want of a crusher: can be driven by steam, water, or horse power.
H. R. Marsden, Esq. JAMES PHILLIPS.

Terras Tin Mining Co. (Limited), near Grampound Road, Cornwall, Jan. 1871.—Blake's patent stone crusher, supplied by you to this company, is a fascination—the wonder and admiration of the neighbourhood. Its simplicity is also surprising. Persons visiting it when not at work have been heard to remark, "This can't be all of the machine." It will crush to a small size from 8 to 10 tons of very hard and tough elvan rock per hour; taking into its leviathan jaws pieces of the hardest rock, weighing 200 lbs. or more, masticating the same into small bits with as much apparent ease and pleasure as does a horse his mouthful of oats. On every 100 tons of the rock crushed by the machine there is a direct saving to the company of not less than £5 over the process of hand labour previously adopted by them, and the indirect saving much more, the machine being ever ready to perform the duties required of it. It breaks the stuff much smaller, and in form so fitted for the stamps, that they will pulverise one-third more in a given time than when performed by hand labour.
Jos. GILBERT MARTIEN.
H. R. Marsden, Esq., Leeds.

Welsh Gold Mining Company, Dolgelly.—The stone breaker does its work admirably, crushing the hardest stones and quartz. WM. DANIEL.

Ovoca, Ireland.—My crusher does its work most satisfactorily. It will break 10 tons of the hardest copper ore stone per hour.
WM. G. ROBERTS.

General Frémont's Mines, California.—The 15 by 7 in. machine effects a saving of the labour of about 30 men, or $75 per day. The high estimation in which we hold your invention is shown by the fact that Mr. Park has just ordered a third machine for this estate. SILAS WILLIAMS.

Your stone breaker gives us great satisfaction. We have broken 101 tons of Spanish pyrites with it in seven hours. EDWARD AARON,
H. R. Marsden, Esq. Weston, near Runcorn.

For illustrated catalogue, circulars, and testimonials, apply to—

H. R. MARSDEN, SOHO FOUNDRY,

MEADOW LANE, LEEDS,

ONLY MAKER IN THE UNITED KINGDOM.

THE DIAMOND DRILL.

PROSPECTING OR TRIAL BORING FOR MINERALS

The DIAMOND ROCK BORING COMPANY (LIMITED) is PREPARED to UNDERTAKE CONTRACTS at FIXED RATES for PROSPECTING or BORING for MINERALS of all kinds. Great speed is attained; work that formerly took years is done in the same number of months, and sample cores are brought up, showing the nature of the strata passed through, and enabling the minerals obtained to be analysed.

The company has a number of MACHINES in SUCCESSFUL OPERATION in different parts of ENGLAND, and the terms, with particulars, will be supplied upon application to—

THE SECRETARY, DIAMOND ROCK BORING COMPANY, LIMITED,
2, WESTMINSTER CHAMBERS, LONDON, S.W.

BOLTS AND NUTS. BOLTS AND NUTS.

MADE BY PATENT MACHINERY.

Suitable for Engineers, Millwrights, Coach and Wagon Builders, Colliery, and other Purposes.

AN EXTENSINE ASSORTMENT OF OVER 200 TONS ALWAYS IN STOCK.

From which orders can be promptly executed. Every description of Bolts and Nuts made to order.

BAR IRON. BAR IRON.

OVER 1000 TONS OF BARS, PLATES, SHEETS, ANGLES, HOOPS, SQUARES, ROUNDS, AND FLATS.
All of First-class Quality.

RAILWAY, COLLIERY, AND TRAM RAILS, TO ANY SECTION.

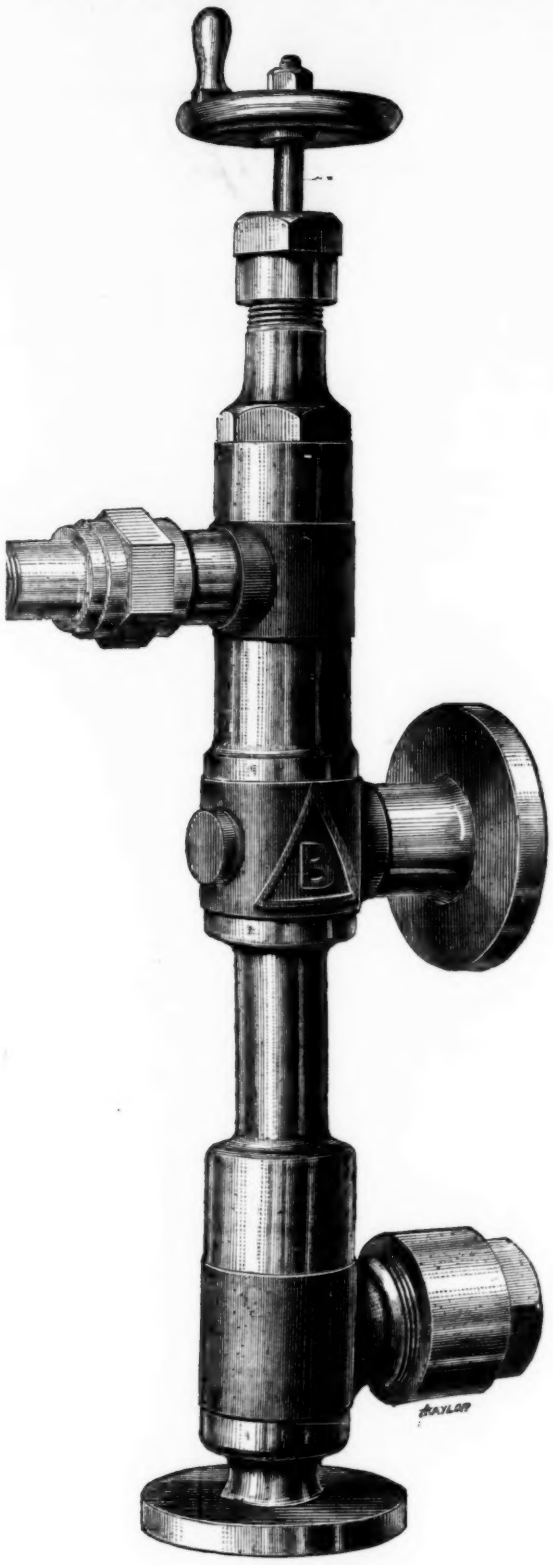
A large Stock of Anvils, Vices, Tue Irons, Smiths' Bellows, Files, Rasps, Picks, Spades and Shovels, Sledge and Hand Hammers, Best Swedish Horse Nails, Back Bands, Plough Traces, Best Spring, Cast, Double Shear, and Blister Steel.

JOHN STANSFELD (late Stansfeld and Sons), Iron Merchants, Bolt and Nut Manufacturers,

ALFRED STREET BOAR LANE, LEEDS.

HALLAM'S PATENT

GIFFARD'S INJECTOR.



View from a Photograph.

Trials with this Injector show under equal conditions fully 50 per cent. more duty than others.

Fewness of parts, great simplicity and stability, are its chief features.

	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
Horse-power at 50 lbs. pressure ...	210	180	140	90	50	35	13	6
Size	H	G	F	E	D	C	B	A
Price, all gun metal	£20	£17	£15	£12	£8 15	£6 5	£3 15	£3 10

To be had direct from the Manufacturer, or from any Boiler Maker, Engineer, Ironmonger, or Machine Dealer in Europe or the Colonies.

SOLE MANUFACTURERS FOR UNITED KINGDOM AND EUROPEAN COUNTIES, AND THE UNITED STATES OF AMERICA,

J. BAILEY AND CO.,

BRASSFOUNDERS,

ALBION WORKS,

SALFORD,

MANCHESTER.

PRIZE MEDALS—PARIS, 1867; HAVRE, 1868; HIGHLAND SOCIETY, 1870.

B. & S. MASSEY, OPENSHAW CANAL IRONWORKS, MANCHESTE

Special Steam Stamp. Hammer for General Smith Work, &c. Hammer for Wheel-making, Copper Work, &c. Hammer for General Smith Work, &c. Hammer for Heavy Forgings.

PATENTEES AND MAKERS OF DOUBLE AND SINGLE-ACTING **STEAM HAMMERS** of all sizes, from 17 lbs. to 20 tons, with Self-acting or Hand Motions, in either case giving a perfectly **DEAD-BLOW**, while the former may be worked by hand when **Large Hammers**, with **Improved Framing**, in **Cast** or **Wrought Iron**. **Small Hammers** working up to 500 blows per minute, in some cases worked by the foot of the smith, and not requiring any separate driver.

SPECIAL STEAM STAMPS, of great importance for Smith Work, Bolt-making, Punching, Bending, &c.

Hammers for Engineers, Machinists, Shipbuilders, Steel Tilters, Millwrights, Coppersmiths, Railway Carriage and Wagon Builders, Colliery Proprietors, Ship Smiths, Bolt Makers, Cutlers, File Makers, Spindle and Flyer Makers, Spade Makers, Locomotive and other Wheel Makers, &c.; also for use in Rolling Smithies of Mills and Works of all kinds, for Straightening Bars, Bending Cranks, Breaking Pig-Iron, &c.

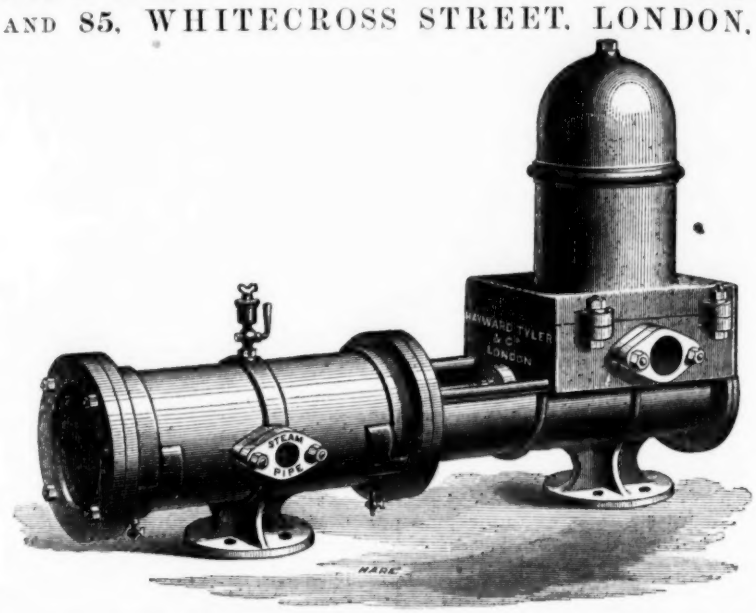
STEAM HAMMERS AND STEAM STAMPS MAY ALWAYS BE SEEN AT WORK.

THE PATENT "UNIVERSAL" STEAM PUMP

SOLE MAKERS,

HAYWARD TYLER AND CO.,

84 AND 85, WHITECROSS STREET, LONDON, E.C.



The rapid and continued increase in the demand for these pumps for coal mines is the best testimonial to the remarkable which has attended them, even under the most difficult circumstances.

"These pumps are now largely used in coal mines, where they have proved themselves extremely useful during the late Their compactness and great power render them extremely useful."—*Chamber of Agriculture Journal*, Dec. 16, 1872.

The Times, Dec. 10, 1869, speaks of them as "possessing many extraordinary advantages."

For remarkable instances of their powers see *Times*, Dec. 14, 1872; *Globe*, Dec. 10, 1872; *Morning Advertiser*, Dec. 9, 2 *gineer*, Dec. 20, 1872, &c. See also descriptions in the *Colliery Guardian* and *Mining Journal*.

FRANCIS MORTON & CO., LIMITED, LIVERPOOL

Manufacture, in Galvanised and Corrugated Iron,

IRON ROOFS, IRON BUILDINGS, IRON SHE

Which they have extensively supplied and erected for mining requirements at home and abroad.

ESTIMATES FURNISHED ON RECEIPT OF PARTICULARS.

F. M. & CO.'S PATENT IRON ROOFING TILES OR SLATES ARE IN SPECIAL FAVOUR FOR TEMPORARY COVERING,

They require considerably less framework to carry them than ordinary slates or tiles.

ILLUSTRATED CATALOGUE ON APPLICATION.

London Office, 36, PARLIAMENT STREET, S.W.

BY HER MAJESTY'S ROYAL LETTERS PATENT.

STANLEY'S PATENT FURNACE

FOR SMELTING ORE OR RE-MELTING IRON OR OTHER METAL,

PUDDLING AND ALL KINDS OF HEATING FURNACES

JOHN MARTIN STANLEY, PATENTEE & SOLE LICENSOR

SHEFFIELD.

The advantages of these furnaces are, in the first place, they effect a saving of from 25 to 50 per cent. in fuel.
2ndly, The use and expense of grate-bars are dispensed with, as these furnaces have closed fire-places, formed in brickwork.
3rdly, They make from 80 to 90 per cent. less ashes than open fire-grate furnaces.
4thly, They have a purer flame, the combustion is more complete, and contains less free or unmixed air or gases.
5thly. The workmen have much less labour in working these furnaces.
6thly, They heat quicker, and are more under the control of the furnace-men.
7thly, They are not affected by the position of the wind or draughts.
8thly, The mills and workshops are cooler and more comfortable than where the open fire-grate furnaces are used.

For prices, and other information, apply to J. M. STANLEY, 27, Change-alley, Sheffield.

THOMAS WARDEN,

LIONEL STREET, BIRMINGHAM,

IRON AND STEEL MERCHANT,

Manufacturer of Every Description of Railway, Colliery, and Contractors' Plant.

A LARGE STOCK OF SECOND HAND RAILS AND PLANT ALWAYS ON HAND.

HE "BURLEIGH" ROCK-DRILLING MACHINERY.

THOMAS BROWN,

ENTEE AND SOLE PROPRIETOR.

URLEIGH" ROCK DRILL.

se and Stand for KING and SINKING.

This celebrated ROCK DRILL, which by reason of its inherent merits has superseded all other Rock Drills, is now in extensive use in America, England, Scotland, and the Continent, and is indispensable in the economic working of all Railway Cuttings, Shafts, Quarries, and Mines.

Its prominent features are:—

I.—ITS SIMPLICITY.

Any labourer can work it, and it does not get out of order. It may be worked either by air or steam power, at will, without any alteration of the mechanism.

II.—ITS DURABILITY.

No part of the mechanism is exposed; it is all enclosed within the cylinder—so there is no risk of its being broken.

III.—ITS CAPABILITY.

In hard rock, like granite, gneiss, iron-quartz, the Tunnel Drill will progress at the incredible rate inches to 12 inches per minute. These machines can bore holes inch up to 5 inches in diameter, and, on an average, will go 120 feet of rock per day—making 40 holes each from 2 to eep. The drill can be used at any angle, and in any direc- will drill and clear itself to any depth up to 20 feet.

IV.—ITS ECONOMY.

mpared with hand labour the saving in actual drilling is siderable, from the fact of the "out put" being increased . The saving in the general expenses, and in the interest of will be in a like ratio.

DRILL POINTS.

ving in steel alone is incredible, ONE DRILL POINT WILL HROUGH TWENTY FEET OF ABERDEEN GRANITE OUT SHARPENING. This fact will be duly appreciated by al men.

---

estimonials, estimates, and other information, apply to—

BROWN & CO., Engineers, 96, ewgate-street, London, E.C.

LSON, McLAY, & CO., Sole Agents, , Talbot-court, Gracechurch-treet, London, E.C.; and 87, St. incent-street, Glasgow.

AVEN BROTHERS, Engineers he Makers), Vauxhall Ironworks, borne-street, Manchester.

THE "BURLEIGH" AIR COMPRESSOR, THOMAS BROWN,

PATENTEE & SOLE PROPRIETOR.

For driving the "Burleigh" Drill, or other Machinery.

The peculiar advantages which enhance the value of this Machine in the estimation of those who have it in practical use are—

1.—The pump pistons are driven by a steam-engine, the connection rods being attached to one crank shaft, the angles being so set that when the greatest power is developed in the steam cylinder the point of the greatest compression is being reached alternately in the air cylinders.

2.—The heat generated by compression of the air is reduced to *nil*.

3.—It is strong and durable compared with its effective power.

For further particulars, and all information relating thereto, please address—

T. BROWN & CO.,

ENGINEERS,

96. NEWGATE STREET, LONDON, E.C.;

WILSON, McLAY, & CO.,

SOLE AGENTS,

2. TALBOT COURT, GRACECHURCH STREET, LONDON, E.C.;

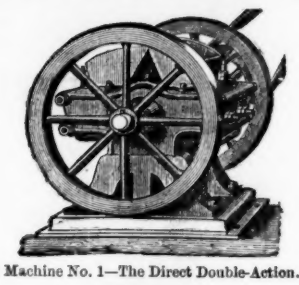
AND

87, ST. VINCENT STREET, GLASGOW.

CRAVEN BROTHERS,

THE MAKERS,

VAUXHALL IRON WORKS, OSBORNE STREET, MANCHESTER.



Machine No. 1—The Direct Double-Action.

IMPROVED

PATENT STONE BREAKING, QUARTZ CRUSHING, AND GRINDING MACHINERY.

Messrs. T. BROWN and Co., ENGINEERS, have much pleasure in calling attention to their IMPROVED MACHINERY for STONE BREAKING and QUARTZ CRUSHING, for crushing, grinding, or triturating Stone, Flint, Minerals, Ores, Chemicals, and other substances; for washing and separating Metals from Ores, and for extracting Gold from Quartz.

The principle of this invention is applied to machines of various construction, which contain within the range of their capability the power of reducing all hard materials to cubes of from 2½ inches to impalpable powder. The mechanical construction of each description of machine is specially adapted for its own peculiar work, and experience has shown that each is eminently suited for the work for which it is designed.

They can be driven by water, steam, or horse power; they are light and portable, and their crushing and grinding surfaces are so constructed that when worn they can easily be replaced.

If intending purchasers would send a sample of the materials required to be crushed or broken it could be operated upon in their presence, and thus they would be guided in the selection of the machine best suited for their requirements.

For prices, and all information relating thereto, please address—

T. BROWN & CO.,

ENGINEERS,

96, NEWGATE STREET, LONDON, E.C.

Or their representatives,—

WILSON, McLAY, & CO.,

2, TALBOT COURT, GRACECHURCH STREET, LONDON, E.C.;

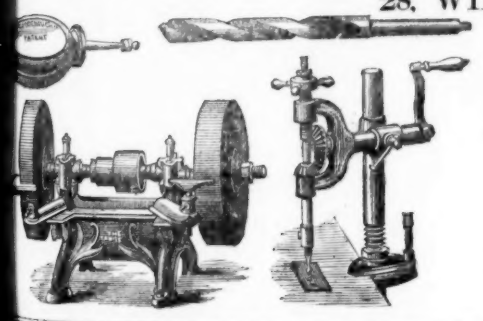
AND

87, ST. VINCENT STREET, GLASGOW.

CHARLES CHURCHILL AND CO.,

MPORTERS AND FACTORS OF AMERICAN MACHINERY AND TOOLS,

28, WILSON STREET, FINSBURY, LONDON, E.C.

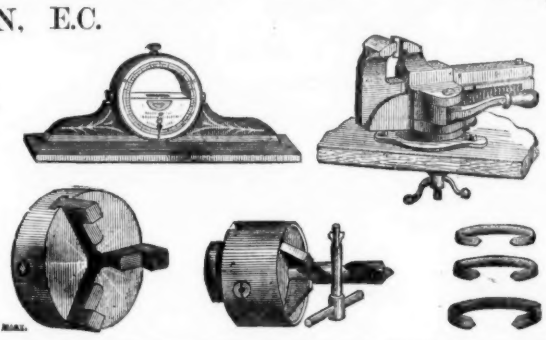


SOLE AGENTS FOR

Morse's Twist Drill, and Machine Company's celebrated Twist Drills and Chucks; American Scroll Chucks; Stephens' Patent Vices; Parker's Patent Parallel and Swivel Vices; Gould Manufacturing Company's Well and Cistern Pumps; Washita, Arkansas, and Hindostan Oil Stones; and all other descriptions of American Tools and Machinery, &c., &c.

C. C. and Co. are prepared to give quotations and execute indents for American Goods of all descriptions, to be shipped to any port.

CATALOGUES AND PRICES CURRENT ON APPLICATION.

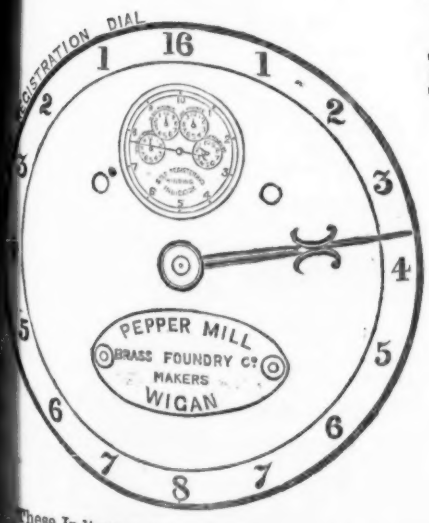


PEPPER MILL BRASS FOUNDRY COMPANY,

DARLINGTON STREET, WIGAN,

COLLIERY FURNISHERS,

BRASS FOUNDERS, COPPERSMITHS, & GAS METER MANUFACTURERS,

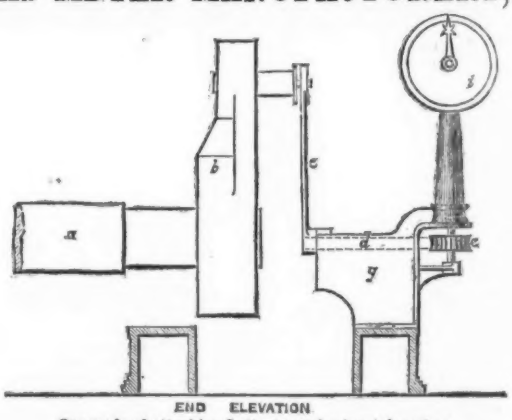


The PEPPER MILL BRASS FOUNDRY COMPANY beg respectfully to invite attention to their IMPROVED SELF-REGISTERING COLLIERY WINDING INDICATOR, which, in addition to its ordinary use of indicating the position of the load in the shaft, registers the number of windings, thus enabling the manager at a glance, and at any moment, to check the return of the banksman or tallyman, by reading off from the dial the number of windings for any stated time.

This Indicator is especially adapted for Water Winding or Pumping. Its indications cannot possibly be tampered with, and unerringly show the number of windings or strokes for any stated period, so that it will at once be seen whether or not the person in charge has been fully discharging his duty.

These Winding Indicators are supplied either with or without the Self-registration Dial.

The Pepper Mill Brass Foundry Company will be glad to furnish, on application, sets of drawings illustrative of the simplest and cheapest mode of attaching their indicators to engines of various constructions, either vertical or horizontal.



END ELEVATION

One mode of attaching Indicator to horizontal engine.

These Indicators have been supplied to most of the principal Collieries in Lancashire, including Wigan Coal and Iron Co. (Limited); Ince Hall Coal and annel Co. (Limited); Messrs. Jonathan Blundell and Son; John Grant Morris, Esq.; Messrs. Pearson and Knowles; Messrs. Andrew Knowles and Sons; annock and Rugeley; Mostyn Coal and Iron Co.; Messrs. Pilkington Bros., St. Helens.

ROCK DRILLING MACHINERY

Brydon, Davidson, and Warrington's Patent.

References, particulars, Estimates, &c., Sent on application.

CHARLES BALL AND CO., lately Sole Agents for

THE BURLEIGH ROCK DRILL

ARE NOW PREPARED TO SUPPLY THEIR NEW

ROCK-BORING MACHINE, OR "POWER JUMPER"

Which they consider far superior to any other Rock-boring Machinery existing, and which they have, therefore, undertaken to bring before the public. The Firm's p

"INVENTORS OF NONE—AGENTS FOR THE BEST"

Secures to its customers the best known machinery, as the Firm is entirely impartial in its adoption of any particular style of machines.

THE "POWER JUMPER"

Is recommended to the public on account of its qualities, which are the following. It is—

CHEAPER,
SIMPLER,
LIGHTER,
SHORTER,
THAN ANY OTHER.

COMPARISON INVITED.

Secondhand BURLEIGH DRILLS FOR SALE.

CHARLES BALL AND CO., Mining Machinery Makers, 21, NEW BRIDGE STREET, LONDON, E.C.

OSWALD BROOKE AND CO.,

51, DALE STREET,
PICCADILLY,

MANCHESTER,

PATENTEES AND SOLE MANUFACTURERS OF

GOVERNMENT FIREPROOF

BRATTICE CLOTH

AND

AIR TUBING.

WORKS: COLLYHURST.

ESTABLISHED 1852.

WEIGHING MACHINERY.

HODGSON AND STEAD,

MANUFACTURERS,

Egerton Works & Hope Foundry,

SALFORD, MANCHESTER.

WALKER'S

PATENT CENTRAL-LIFT STAMPS.

This is the MOST IMPORTANT INVENTION for

CRUSHING ORES AT A SMALL COST.

For all new mines they are invaluable.

Can be SEEN at WORK every day at 12, JAMES STREET, OLD STREET, E.C., near CITY ROAD.

THE PATENT SELF-ACTING MINERAL DRESSING MACHINE COMPANY (LIMITED).

T. CURRIE GREGORY, MINING ENGINEER.

OFFICES,—62, ST. VINCENT STREET, GLASGOW.

This company grant licenses, under their patents, for the use, singly or in combination, of the most approved machinery for dressing ores, comprising Stamps, Jiggers, Side-blow Percussion Tables, Classifiers, and Buddles.

The whole in combination are in successful operation at Rhoswydol Mines, Maeh ynlleth, the Bog Waste, Shropshire, Darren and Gertrude Mines, Cardiganshire.

The Jiggers are largely used at the Van, Caldbeck Fells Mines, and at many mines, with unqualified success.

Self-acting Floors are in course of construction at various mines in England and Scotland, regarding which Mr. GREGORY will be pleased to give information, answer all enquiries, and give orders for inspection.

Mr. GEORGE GREEN, of Aberystwith, the company's mechanical engineer, is prepared to give designs and estimates, or contract for the supply of machinery, and for the laying out of floors.

He is doing a large business in the supply of Dressing Machinery for the treatment of Gold and Silver Ores in Foreign Parts, and all classes of ores at home.

He has devoted himself to the perfecting of Self-acting Dressing Machinery, and has, by his inventions, greatly conduced to the success of the system.

T. CURRIE GREGORY, Secretary.

THE IRON AND COAL TRADES' REVIEW:
ROYAL EXCHANGE, MIDDLESBOROUGH.

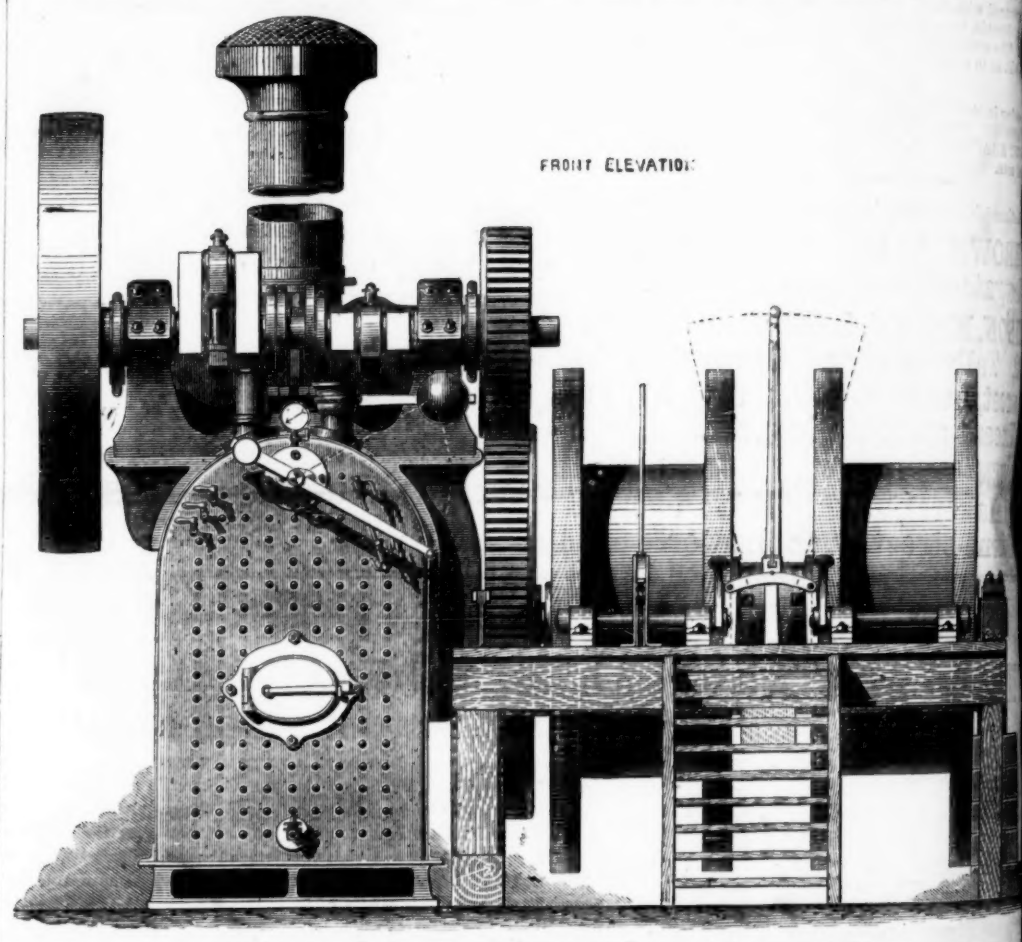
The IRON AND COAL TRADES' REVIEW is extensively circulated amongst the Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron and coal districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufactures, Machinery, New Inventions, and all matters relating to the Iron, Coal, Hardware, Engineering, and Metal Trades in general.

Offices of the Review: Middlesborough-on-Tees (Royal Exchange); London, 11 and 12, Red Lion-court, Fleet-street; Newcastle-on-Tyne (50, Grey-street)

MINING PROSPECTUSES AND ANNOUNCEMENTS OF PUBLIC COMPANIES should be inserted in the BARNSTAPLE TIMES, published every Tuesday, and in the DEVON POST, published every Saturday, as these papers circulate largely throughout Devon and Cornwall, where many thousands of investors reside. Legal and Public Companies' advertisements, 6d. a line each insertion; Trade and Auctions, 4d. a line; Wanteds, &c., 20 words, 1s.

Published by J. B. JONES, Bontport-street, Barnstaple, Devon, to whom all orders, by post or telegraph, should be sent.

THE ROBEY MINING ENGINE



FROM 20 TO 200 EFFECTIVE HORSE-POWER.

FOR FULL PARTICULARS AND PRICES, APPLY TO—

ROBEY AND COMPANY, LIMITED,

PERSEVERANCE IRONWORKS, LINCOLN.

ALSO OF PATENT PORTABLE

HAULING AND WINDING ENGINE

WITH

PATENT DRUM WINDLASSES,

FOR MINING PURPOSES.

This Engine is specially commended to Mining Engineers and others, as by its adoption—
Haulage along inclined drifts is easily and cheaply effected;
The expense of sinking new shafts is greatly reduced, neither foundations nor engine-house being required
It is available not only for winding, but for pumping, sawing, &c.—a great desideratum at a large colliery;
It can be very quickly removed (being self-propelling), and fixed in any desired position.
Prices and full particulars on application as above, and also references to view the engine in successful work near Derby, Carnarvon, Haverfordwest, Darlington, Durham, Penzance, and other places.

THESE ENGINES WORK WITH MARVELLOUS ECONOMY IN FUEL.

CHAS. PRICE AND CO.'S RANGOON ENGINE OIL

AS SUPPLIED TO H.M. DOCKYARDS AND FLEET.

THIS OIL is suitable to every kind of Machinery. As a lubricant it is equal to the best Sperm or Lard Oil, while it possesses the great advantage of being entirely free from any principle which will corrode the metal bearings.

For particular kinds of Machinery, the Oil may be specially prepared of a consistency and character adapted to the nature of the work to be done.

"Chemical Laboratory, 7, Printing House-square, Blackfriars, April, 1869.

"I herewith certify that the Rangoon Engine Oil, manufactured by Messrs. Chas. Price and Co., is free from any material which can produce corrosion of the metal work of machinery. It is also calculated to protect metallic surfaces from oxidation.

"The lubricating power of this oil is equal to Sperm or Lard Oil.

"T. W. KEATES, F.C.S., &c., &c.

Every parcel of the Oil sent from the work bears the Trade Mark of the Firm.

LONDON: CASTLE BAYNARD, UPPER THAMES STREET.
WORKS: MILLWALL, POPLAR; and ERITH, KENT

Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors), at their office, 36, FLEET STREET, E.C., where all communications are requested to be addressed.—April 19, 1873.